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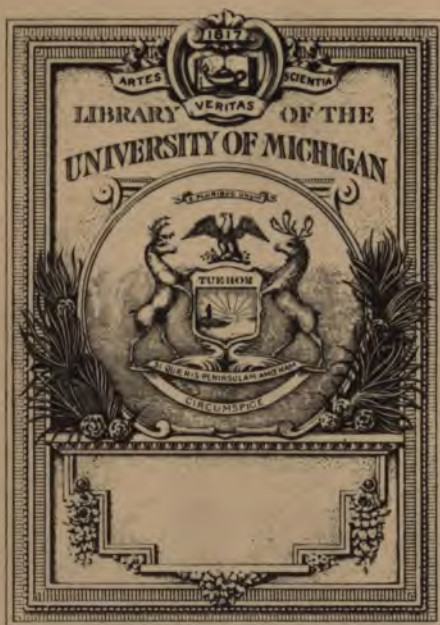
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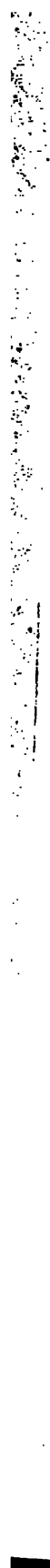
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Nervous and Mental Disease Monograph Series No. 28

**The Autonomic Functions and
the Personality**

BY

DR. HOWARD J. KILPATRICK

Professor of Psychology

New York and Washington

1921

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NERVOUS AND MENTAL DISEASE MONOGRAPH SERIES NO. 28

The Autonomic Functions and the Personality

BY

DR. EDWARD J. KEMPF

NEW YORK, N. Y.

FORMER CLINICAL PSYCHIATRIST, SAINT ELIZABETH'S HOSPITAL
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TO THE MEMORY OF

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She was one of those women whose faith in God and Nature,
as the nature of God, inspires men to study Nature.

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PREFACE

It has always seemed to me that the inability of earnest, intelligent students of medicine and psychology to grasp Freud's and Jung's libido concepts indicates that there must be something not quite satisfactory with the idea of *libido*. Although it attempts to give a more intimate portrayal of the energetic constitution of man and his love of life, it savors of metaphysics because the mind is unable to conceive clearly of a process without some *thing* to proceed. From another source—an old aversion for the clerical-academic, vague soul hypothesis and its unintelligible psychophysical parallelism—I have for some time felt that the only psychological conception that can be expected to endure must be founded entirely upon the functions of the reflex circuit and the autonomic apparatus.

The recent laboratory demonstrations of the peripheral autonomic origin of the craving for food (acquisitive-assimilative) and the craving to urinate (avertive-emissive), and the capacity of the dominant autonomic apparatus to become conditioned to react to indifferent stimuli, that have been coincidentally associated with its primary stimuli, have permitted the completion of a conception of the personality on the basis of the conditioned autonomic reflex. Hence a dynamic mechanism, that can be visualized by the student, may be substituted for the libido concept.

I am particularly indebted, in order, to the works of Darwin, Sherrington, James, Freud, Cannon, von Bechterew and Watson, and the teachings and personal influence of my teacher in psychology, Prof. Ernest Lindley; in physiology, Profs. W. Moenkhaus and J. Macleod; and in psychiatry, Prof. Adolf Meyer and Dr. W. A. White. From the thoughts and works of these men, scientific data, suggestions and theories finally became associated together for me in the following conception of the dynamic nature of the personality and its place in the great cosmic system.

I wish especially to express my thanks to Dr. White for his suggestions in the preparation of the book, and to Dr. Stanley Cobb, Miss Clara Willard and Mrs. Kempf for suggestions in correcting the manuscript.

EDWARD J. KEMPF

SAINT ELIZABETH'S HOSPITAL,
November 7, 1917.

INTRODUCTION

In order to make a brief presentation of an autonomic principle that has extensive manifestations in all the forms of the *biocosmos* it must be presumed that the reader has an elementary knowledge of biology and psychology, otherwise some of the discussion will seem barren of supporting facts.

This book has been written to show how the autonomic apparatus dominates the organism, and that the affections have their origin in the peripheral functions of this apparatus. Therefore the affections should be recognized as the dominating, dynamic force of the personality, that determine the nature of its normal and abnormal traits and behavior. A theory of the *neutralization* mechanism of the autonomic or affective functions is proposed in the text and the psychological nature of its variations is presented so that the reader may use the theory and data in his work with biological and psychological problems. By developing a thoroughly dynamic conception of the personality, the biologist and physiologist, the psychologist and psychiatrist, the clinician, the criminologist, and the social worker can acquire a far more intelligent insight into their problems. At present there is an unusually strong tendency among behaviorists and biologists to urge psychobiological conceptions that include the personality as a whole, following the suggestions of Hughlings Jackson, on the three integrative levels—structural, physiological and psychological. This is particularly valuable in that it discourages the adoption of the old, sinister soul-body, parallelistic notions of the personality which have so long diverted enthusiasm and obscured the vision of psychobiological researchers.

On the other hand the movement encourages the substitution of a practical monistic conception of the personality and promises marked practical results. The adoption of merely a monistic viewpoint, is, however, wholly insufficient. The history of philosophy shows that, as soon as a generation of researchers and students become familiar with monistic or parallelistic forms of thinking, the natural, irrepressible question arises, "Well, how does the mechanism as a unity actually work?" Then follows an epidemic of speculative explanations which finally wears itself out and the preponderance of aggressive thought swings to the opposite side.

This monograph will probably arouse the charge of precocious

theorizing and I feel that the suppressive influence of this attitude, so widely characteristic of the multitude of American university professors, is so serious in its sterilizing influence upon original thinking that I wish to quote Charles Darwin, from his autobiography. Herein he reveals the attitude that enabled him to break away from the suppressive educational system of England and readjust, for a time it seems, the thinking methods of modern science. He says: "From my early youth I have had the strongest desire to understand or explain whatever I observed, that is, to group all facts under some general laws. These causes (pure love of natural science and the desire to be esteemed by his fellow naturalists) combined have given me the patience to reflect or ponder for any number of years over any unexplained problem." "I have steadily endeavored to keep my mind free so as to give up any hypothesis, however much beloved (and I cannot resist forming one on every subject), as soon as facts are shown to be opposed to it." "Science consists in grouping facts so that general laws or conclusions may be drawn from them."

My theory of the dynamic nature of the personality is submitted to those whom it may interest with most decidedly the attitude, that no matter how enthusiastically I may ever regard it, it is only worth its working value. No theory or conception of life is worth being upheld as a creed except by those who need it to comfortably maintain affective repressions. A theory should only be submitted with the purpose that it shall be, if necessary, unreservedly modified so as to be inclusive of all facts. This was the method of Darwin and why should it not be the method of Science?

Until students of animal and human behavior learn to present behavioristic and psychopathological experiments and observations, affective mechanisms and basic principles of behavior, so that they are clearly translatable into the fundamental mechanisms of the integrative functions of the nervous system, they are in danger of working with fine psychobiological blanket phrases that merely cover up parallelistic forms of thinking. Since even two such thinkers seem unable to clearly understand one another it is highly imperative that students of human and animal behavior shall learn to think from a common, simple, yet comprehensive, practical attitude.

In order to develop a method of making and presenting clinical and behavioristic observations that will avoid the tangles of body-soul or mind-matter parallelism, a new reëducational epoch of neurologizing and psychologizing is developing.

Evidence of this is already to be seen in the physiological works

of Sherrington, Cannon, Crile, and others. Holt's adoption of the "wish" in his book on "The Freudian Wish" as the "first key which psychology has ever had which fitted and, moreover, the only one that psychology will ever need" (29, p. vii), indicates the nature of the physiological trend in academic psychology. As to the nature or source of the energy of the wish Holt says: "One will best, I think, not hypothecate to this end any such thing as 'psychic energy,' but look rather, for the energy so expended in the nervous system" (29, p. 4). This brings the student abruptly to the physiology of the emotions and the nature of the autonomic functions of the personality.

Watson, in his physiological work on "Behavior," in order to avoid the dilemma that always arises with the adoption of the parallelistic soul-body hypothesis, wholly ignored the function of consciousness, which rather weakened the monistic position, the phenomena attending consciousness being the last stronghold of the parallelist.

Consciousness of self is too omnipresent a fact to be disregarded. There is a distinct functional difference between the integrative functions of the unconscious and the fully conscious individual which lies in the persistent fact that in the latter *consciousness of self exists, and in the former it does not*. The assumption that in the unconscious animal some coördinating cerebral area or center is out of order is unsatisfactory, if it is held that in this center or centers consciousness of the functions of the rest of the body exists when the center is in proper working order, because cerebral pathology cannot demonstrate it even by elimination of each cerebral area. If it is, however, assumed that the afunctional brain area prevents the organism from reacting as an *integrative unity to the special or sensation producing activity of some one or several of its parts, and the result of this function of reacting as a unity is consciousness*, that is, awareness by the body as a whole of the hyper-activities of some division of itself, then the psychologist and psycho-pathologist may deal with consciousness as a physiological phenomenon without being embarrassed by the mind-matter riddle.

The phenomenon of consciousness, as a result of the synthetic activity of the constituent parts of the organism, is as much of an entity or fact as a nerve cell is a synthetic structure; duration of existence not being a fundamental difference. There has been a sleight-of-hand movement in psychology to drop the term "consciousness" and adopt the term "awareness" in order to escape the Sphinx. If the above physiological conception of the mechanism of consciousness of self is true then the psycho-physiologist has an en-

tirely different problem to work out than that which the old cerebralizing notions of neurologists created for him.

The psychological laboratory method of studying human behavior is peculiarly unsuited for the study of the *spontaneous* behavior of an adolescent or adult subject because the tendency to be conscious of himself continually interferes with the spontaneity and determination of his reactions. The individual who has learned to analyze the *spontaneous* adjustments and inspirations that occur in his daily life becomes aware of processes that the controlled-introspective method of analysis never permits him to recognize. Because of this the importance of the wish was not recognized until a patient's behavior demonstrated it to the founder of modern psychopathology—Sigmund Freud.

In the following study of the autonomic functions of the personality physiological and psychological, experimental data, psychopathological data and observations of *spontaneous* normal behavior have been used to demonstrate the nature of the autonomic influence upon the structure and behavior of the individual.

The theory of the autonomic functions is presented before the discussion of the data, upon which it is formulated, in order that, if the reader will familiarize himself with it before reading the discussion, it may greatly facilitate considering the facts in the light of the theory.

The discussion of the autonomic functions and their fundamental law is naturally divided into their three manifestations—*structural*, *physiological* and *psychological*.

In Part I, the plan of the structure or anatomy of the higher organisms is discussed to show that since the process of *atrophy of disuse* tends to eliminate the useless material and movements on the one hand, and the *growth of the useful* tends to *make permanent* necessary material and movements on the other, the architecture of an animal should reveal in a general but reliable manner the fundamental law or process that determined the peculiar form of its existence. To be sure there are anatomical features that seem inexplicable on this hypothesis, probably because we are as yet not able to imagine an explanation, having insufficient data.

Part II is devoted to a consideration of such physiological data as are suited to demonstrate the dominant nature of the autonomic apparatus. The interpretation of (1) *the continuity of postural tonus of the striped muscles as the source of a continuous kinesthetic stream*, and of (2) *the unstriped muscles as the source of a continuous affective stream*, is based principally on the physiological re-

searches of Sherrington and Langelaan and on introspective observations of spontaneous reactions. Researches of Cannon and Sherrington on the nature and origin of hunger and fear, and the laboratory demonstration of the peripheral origin of the desire to urinate are advanced to demonstrate the *peripheral* origin of the affective cravings in the autonomic functions.

It is but proper to acknowledge here that Cannon and Sherrington were inclined, from their researches, to believe in the cerebral (central) origin of the emotions in the sense that the autonomic changes resulted from *cerebral-emotional* disturbances. The same research material, plus other data, is used in order to show that *emotions are not experienced upon the cerebral changes that precede the autonomic changes, but that an emotion only comes into existence as the peripheral autonomic reactions become active.*

Liberal use is made of Cannon's work on the bodily effects of pain to show that a painful stimulus, whether contact, visual or auditory, disturbs the autonomic apparatus, creating a peculiar state of tension or unrest, which compels the adjustment of suitable receptors so as to acquire such stimuli as have the capacity to produce a return to a comfortable autonomic state. The dynamic value of increases in the quantity of adrenin and blood sugar for this purpose is also emphasized.

Laboratory, clinical and psychopathological data are used to show that variations in the affective stream are due to peripheral variations in the autonomic functions, which is contrary to the general belief that visceral reactions *appear* to be similar for different emotional states and the variation in function probably occurs in the central nervous system.

The law that autonomic functions, or affective cravings, become *conditioned* to react to ordinarily indifferent stimuli, because the latter have been coincidentally associated with the inherent primary stimuli of a particular autonomic function, is taken as the basis of the training of the personality and its individual characteristics, whether normal or abnormal.

The more popular conceptions of emotions and instincts show that there is an *illy* defined tendency among psychologists to differentiate them according to the physiological functions involved. In Part III, this material is advanced to stabilize the primary effort of the monograph, namely, to obtain recognition for the fact that *in the higher organisms an affective sensori-motor system (autonomic) exists which created and uses the cerebro-spinal or proficient sensori-motor system as a means to keep in contact with the environment in order that the autonomic apparatus may fulfill its biological career.*

The recent tremendous advances in psychopathology are forcing a delayed but appreciable recognition from the academic psychologist. Hence the mechanisms of affective conflict, repression, fixation, dissociation, regression, readjustment, coördination and reënforcement, reciprocal inhibition of the negative or antagonistic wish, and affective compensation with sublimation or refinement, are discussed in Part III, with the object of showing that *the affective mechanisms probably originate and persist in the heightened postural tensions of particular divisions of the autonomic apparatus*. The physiologist and psychologist will probably, in the near future, cooperate in working out the relations of definite affective traits to particular postural tensions of autonomic segments, on the hypothesis of hypertension and hypotension of various autonomic segments determining the content of consciousness through the affective stream seeking neutralization.

The particular physio-psychological phenomenon of hyper- or hypotension of different divisions of the autonomic apparatus, and the mechanism of its creation and continuation, has not yet received the specific attention and discussion it deserves. It seems to be the most important psychobiological phenomenon in the determination of the character of the personality that confronts psychopathology and psychology at present.

A brief discussion of functional anesthesia, which was suggested by a case of so-called hysteria, as a possible explanation of the physiology of recall of sensory impressions (memory) and attention, and a discussion of the manner in which the entire integrating mechanism produces consciousness of itself closes the third part.

Part IV is devoted to a brief restatement of the functional principles of the personality with some consideration of man's place in nature.

The references are listed at the end of the book and each reference is numbered. The reader will find the number of the reference and its page number inserted in the text as the references are used. The first number refers to the reference.

THE THEORY OF THE DYNAMIC-AUTONOMIC FUNCTIONS AND THE PERSONALITY

In the higher animals and man an autonomic or affect-producing sensori-motor system exists which uses a projicient sensori-motor system as a means to project and keep itself in contact with the environment. The affective sensori-motor system has specialized physiological functions and a definite anatomical structure, consisting of the entire autonomic apparatus and the sympathetic or un-striped part of the striped muscle cells. The latter make a reënforcing affective contribution to the personality through the postural tonus of the striped muscles, particularly the facial muscles and extensor and flexor muscles of the skeleton. (The nervous division of this cellular system has often been referred to as an involuntary, or vegetative, or sympathetic nervous system.)

The projicient sensori-motor apparatus has also specialized functions and a distinct anatomical structure in the entire cerebro-spinal apparatus (so-called voluntary) which does not include those autonomic centers and their nerve fibers which are embedded in it. (The projicient sensori-motor apparatus, it appears from the nature of postural tonus and kinesthetic imagery, is, in a sense, the thinking apparatus of the organism.)

The theory advanced is that *whenever the autonomic or affective sensori-motor apparatus is disturbed or forced into a state of unrest, either through the necessities of growth, metabolism, or endogenous or exogenous stimuli, it compels the projicient sensori-motor apparatus to so adjust the receptors in the environment as to acquire stimuli which have the capacity to produce adequate postural readjustments in the autonomic apparatus. In this manner, only, the disturbance of function may be neutralized. The constant tendency of the autonomic apparatus is to so organize the projicient apparatus into a means as to acquire a maximum of affective gratification with a minimum expenditure of energy or effort.*

This continuous dynamic pressure determines the tendency towards perfection through practice, eliminates the useless and stabilizes the useful. It determines the evolution of organic structure, of personality, behavior and achievement. The healthy individual is a dynamic entity that has an elastic though limited quotient of energy, hence the tendency to attain a maximum influence upon the environ-

ment with a minimum expenditure of his resources conserves the unused resources for further extension of power and influence. In commerce men are constantly striving to find methods of reducing the waste of power and of extending the control of power. Each invention that improves a method in either direction causes the old method to be discarded. This principle is also to be seen in the individual's refinement of his personality, as speech and movements, until he attains a comfortable maximum of skill.

In discussing the above conception of the dynamic nature of the personality the entire organism is conceived as a unity and the *central nervous system is reduced to a means, or instrument, for, first the integration of the various physiological divisions into a functional unity, and, second, the reënforcement of their powers.*

Franz (46, p. 161) has concluded from his experiments on the variations in distribution of motor centers that "the same forms of behavior are not always due to the activities of the same cerebral cells." When such data and conclusions are associated with the recent work on the influence of the proprioceptive arc and postural tonus, the old, unfounded notions about the supremacy of the cerebral cortex and localized origin in the cortex of the controlling forces of behavior must be considered to have been thoroughly undermined by the more recent contribution to the knowledge of the nervous system.

PART I

STRUCTURAL INDICATIONS OF THE PRINCIPLE OF THE AUTONOMIC FUNCTIONS

In order to build up or attain a dynamic conception of the personality, the body must be seen as a biological machine that assimilates, conserves and expends energy. Since nature constantly tends to conserve the useful through trophic processes and discard the useless through atrophic processes the present structure of the human body as a unit of anatomical parts should reveal the dynamic principle upon which it has been developed.

The physiological divisions of the body that have the essential functions of assimilation, conservation, distribution and regulation of the expenditure of energies and the elimination of waste products, work as one autonomic apparatus. Because of the vital importance of the autonomic apparatus in the higher animals and the nature of its evolution attention is called to the nature of the primordial autonomic apparatus and its relation to its environment.

All organisms are immersed in a continuous bath of environmental stimuli. This bath, in so far as an organism is concerned, is composed of two general types of stimuli, the *harmful* and the *beneficial* (because of destructive or constructive mechanical and chemical effects), for which all organisms have some avertive or acquisitive capacities. Because the living organism itself is a continuous, complicated stream of metabolism, literally flowing through the stages of infancy, adolescence, maturity and senility, its avertive and acquisitive needs are constantly changing and this fluctuates the value of what is a relatively small proportion of the environment back and forth, as harmful or beneficial.

The avertive and acquisitive needs and motor tendencies, as will be shown later, depend upon the disposition of the autonomic apparatus. The primordial autonomic apparatus may be seen in the unicellular organism where it has highly developed capacities for the assimilation, conservation and expenditure of energy, but relatively poorly developed capacities for avoiding harmful or acquiring beneficial stimuli. In the ameba and the phagocyte, as free, perfect cells, one finds a complete autonomic apparatus, but only a temporary pro-jicient apparatus in the pseudopodia.

As some forms of the primordial autonomic apparatus became more powerful they probably became able to conserve enough energy to sustain a permanent projicient apparatus. When the ameba reaches a certain stage of nourishment it undergoes mitosis. The manner of growth of the embryo of higher organic forms suggests that during the gastrulation period all the cells retain independent metabolic functions until the layers begin to thicken and some of the intermediary cells have insufficient access to the food supply. Then food-distributing cells and a circulation apparatus begin to appear in that group of cells (mesoderm) which has the least access to a food supply. Not until after considerable progress has been made in the physiological division of labor, and the specialization of function and structure in the autonomic apparatus, do some of the cell groups take on the attributes of the permanent projicient apparatus.

As the autonomic apparatus becomes more powerful and its divisions highly specialized it is also able to sustain a more intricate projicient apparatus which in turn enables the autonomic apparatus to further extend its capacities for the assimilation and conservation of energy. The structural plan of the two systems in the higher animals shows how the two systems have grown apace and moulded one another, as for example the shape of the lungs and the thorax, but the initiative always comes from the autonomic apparatus. Higier emphasizes the fact that the "myelin sheaths (47, p. 79) develop first in the ganglion system, then in the metameric system, then in the mid-brain system, and finally in the cerebral and cortico-associative systems."

On the basis of this dynamic initiative the evolution of the needs of the autonomic apparatus may be considered as the determining factor of the structure of the projicient apparatus, hence the structure of the body and the nature of its practical adaptations to the environment. *But the successfulness of the career of the organism depends upon the capacity of its receptors to react to stimuli in order that the autonomic apparatus may differentiate harmful from beneficial types.* These qualities in stimuli are usually not differentiated by the exteroceptor but by the autonomic apparatus through the reactions the stimuli produce there. That is, the eye does not differentiate the grewsome from the pleasant painting; this is determined, as will be shown later, by the peripheral autonomic reactions or feelings that are aroused by what the eye sees.

Since the only contact the autonomic apparatus has with the environment is through the exteroceptors, its career and integrity must depend upon its capacity to keep these receptors exposed to appro-

priate stimuli. So long as the moose can keep its nostrils free from the odors of man its margin of safety is greatly increased, but when the food supply is in the area of the man odors a compromise of the avertive and acquisitive tendencies must be made. This compromise of avertive and acquisitive tendencies is also characteristic of plants and insects. If a white mustard seedling is suspended on a cork float in a water culture and illuminated equally from all sides the stem grows practically straight upward and the root straight downward. Then if all the light is closed off except from one point the stem will bend toward the light and the root will turn away from it. (From Macfarland.)

Numerous illustrations are not needed to show that the avertive and acquisitive tendencies opposing one another, as the organism makes its complex reactions to the environmental stream, determine the organism's position and course in the environment and its organic structure. *An organism's behavior in the environment, at any moment, is the resultant of its avertive and acquisitive cravings as they control the final common motor paths of adaptation in order to properly expose its receptors.* The importance of the receptors to the older cellular forms probably necessitated the evolution of the sense cells into sense organs and then the integrating nervous system (Higier). "All nervous functions have had their phylogenetic origin in the activity of the oldest sense cells and the direct descendants of these cells. Among these must be included the little known paraganglion cells, the chromaffin cells and above all the cells of the sympathetic and autonomic ganglion, *i. e.*, the ganglionic system" (Higier, 47, p. 79).

Relatively little of the brain is necessary to the vegetative functions. It is, however, essential for procuring materials that are necessary for the existence of the vegetative functions.

In the case of the mustard seedling it is important to recognize that when the stem grows toward the light it also grows away from the darkened areas and that the root grows toward the darkened area and away from the light. The ambivalent avertive-acquisitive nature of growth and structural determinism becomes of the utmost importance when the psychic functions of organisms are studied.

The successful struggle for existence obviously has always depended upon the organism's capacity to develop efficient means for meeting its emergencies, and upon the method of associating the projicient apparatus with the receptors has depended the whole biological career of all organisms that try to master the environment.

We may therefore conclude that in the higher forms a system of skeletal levers has been developed which are manipulated by systems

of muscles that work in opposition to one another so that the position of the lever in space is always the resultant of the parallelograms of opposing muscular forces. By this elaborate system of third-degree levers the organism or its parts can be shifted about in the environment or manipulate the environment so that the stimuli which are adequate for the autonomic needs of the organism can be acquired and the other stimuli can be avoided. This seems to have always been the underlying motive of organic evolution.

The functions of this elaborate motor system are coordinated by the cerebrospinal nervous system. The cerebrum (Sherrington, 1, pp. 347-349) is a large ganglion that has been developed upon the extero-receptors of the organism, particularly distance receptors, and the cerebellum is the head-ganglion that has been developed upon the proprioceptive system.

Since the receptors are so highly specialized that they will only react to specific types of stimuli, for which they are said to be positive, and cannot react to all the other stimuli, for which they are negative, and since they are fixed in their anatomical positions, the organism must use the motor system to shift its various receptor groups about in the environment, to repeat, in order that it may adequately expose them or withdraw them from the stimuli for which they are specialized and also protect them from harmful stimuli. For example, since saltiness cannot be seen, heard or felt, to become aware of such qualities in an object the taste receptors must be exposed to it or the organism can have no consciousness of saltiness.

Sherrington expresses the dual function of the receptor as follows: "The main function of the receptor is—to lower the threshold of excitability of the arc for one kind of stimulus, and to heighten it for all others" (1, p. 12).

It has been pointed out that the selective function of receptors is based upon their specialized capacity to react to "different forms of vibratory energy." The skin contains tactile receptors which react to contacts ranging from 1 to 1,552 vibrations per second. The internal ear reacts to vibrations of air ranging from 30 to 30,000 per second (2, p. 70). The retina reacts to ethereal waves giving sensations of brightness and colors, according to the ethereal vibrations. The skin gives reactions to radiant heat from objects. *Taste* and *smell* react to chemical stimuli, and, of the two, smell reacts to particles which are small enough to float in the atmosphere.

The distance receptors have all been grouped in the most elevated, antecedent, and most easily protected segment of the body,

and have the shortest circuits to the great coördinating centers and distributing tracts of the nervous system. Since the head segment, in order to acquire food, is exposed to the greatest danger, we may see in the development of its architecture the fundamental principle of economy upon which is based the evolution of all life—namely, *to acquire a maximum of result for the affective needs with a minimum expenditure or loss of energy*. The mouth in the higher vertebrates is placed at the tip of the head and may be extended farthest into the environment and is usually first exposed to danger. Just above it lies the olfactory apparatus to discriminate dangerous odors and undesirable food before it is seized, within the mouth are several varieties of taste receptors to further discriminate undesirable foods and to augment the digestive preparations for the desirable food. At points in the head which are usually more highly elevated are located the eyes, arranged for greatest range of vision with a minimum of exposure to injury, and on the sides of the head the auditory apparatus is fixed, but with adjustable auricles to catch the sound waves. Whatever organ or group of organs we may examine, as any one tooth or the teeth as a group, any bone, muscle, muscle group, muscle cell, any gland of internal secretion, the stomach or the entire digestive apparatus, the hand or the nail of a finger, a corpuscle or the entire organism as a cellular unity, it reveals that its structure fits the purpose or function of tending to obtain a maximum of result with a minimum expenditure of energy; *the result to be obtained always refers back to the particular needs of the autonomic apparatus for which the proficient instrument is used*.

This principle is found also to hold true, in an elastic sense, for the development of immunity for many infections and the production of antibodies.

It may be objected by those who would hold this theory to a strict interpretation that there is a general tendency to over-production of reconstructive or defensive material, as when bones are broken or infections occur, and the application of the principle of maximum result for a minimum expenditure of energy is not apparent in the excesses of the defense.

The protective or compensatory adjustment must also include *quickness* as well as *durability* and *thoroughness* of the defense. What seems to be an excessive expenditure of defensive energy is probably just sufficient to make the speediest reconstruction possible under the circumstances. A vast *excess* of war material is always created with the ending of warfare, but this was not too excessive until the decline of the enemy began. When a poor defense is made a protracted siege or illness occurs.

The survival of the fittest in the universal struggle for life often depends upon the marked severe change of function of some organic structure and the sacrifice must be made, perhaps even entailing the loss of all but the rudiments of the structure, if it is an unmodifiable hindrance. It may be suggested here that the most persistent and intensively disturbing affective or autonomic influence upon the structure of an organism is *fear*. Changes in structure seem to appear first in the projicient apparatus as the organism adapts itself to new conditions in the environment for comfort and safety.

There is little difference of opinion as to what organs constitute the autonomic apparatus. Unfortunate differences in naming the system and its division have been somewhat confusing. Higier, White and Jelliffe use the term *vegetative*. Gaskell uses the term *sympathetic*, and Langley and Cannon use the term *autonomic* to include the same, that is, the entire involuntary apparatus. The term autonomic seems to best suit the dynamic nature of the apparatus and its affective functions.

Gaskell (3) places in his sympathetic system the following groups of unstriped muscles in vertebrate animals, which are characterized by their innervation and by response to certain substances formed naturally in the body, namely, (1) a vascular group, (2) a group of muscles underlying skin or epidermis, (3) a group of muscles underlying the surface of the gut or endoderm, (4) a group of muscles around the segmental duct, (5) a group of muscles forming part of the gut walls which especially constitute the system of sphincter muscles, (6) a group of muscles connected with the adjustment of vision. These groups of unstriped muscles include all the musculature of the autonomic apparatus.

Herrick (2, p. 225-232) says of the sympathetic nervous system that it consists of two imperfectly separable parts. "The first is a diffusely arranged peripheral plexus of nerve cells and fibers adapted for the local control of the organs with which it is connected"—"the *peripheral autonomous* part." "The second part of the sympathetic nervous system includes those neurones which put the peripheral autonomous system into functional connection with the central nervous system, thus providing a central regulatory control over the autonomous system. This part of the sympathetic nervous system includes the peripheral courses of the neurones involved in the *general cerebro-spinal visceral* reflex systems."

He divides the so-called cerebrospinal visceral nervous connections into (1) midbrain sympathetic, (2) bulbar sympathetic, (3)

thoracic-lumbar sympathetic (I thoracic to II or III lumbar) and (4) sacral sympathetic (II to IV sacral).

✓ 1. The mid-brain sympathetic regulates the functions of the sphincter of the iris and ciliary muscle.

✓ 2. The bulbar sympathetic—the heart, blood-vessels of mucous membranes of the head, salivary glands, walls of digestive tract from mouth to descending colon including outgrowths of this region—as trachea and lungs, gastric glands, liver, pancreas.

3. The thoracic-lumbar sympathetic, dilator of iris, orbital muscles, arteries, muscles and glands of the skin, blood vessels of lungs and abdominal viscera and of digestive tract between mouth and rectum, arteries of skeletal muscles, muscles of spleen, ureter, and internal generative organs.

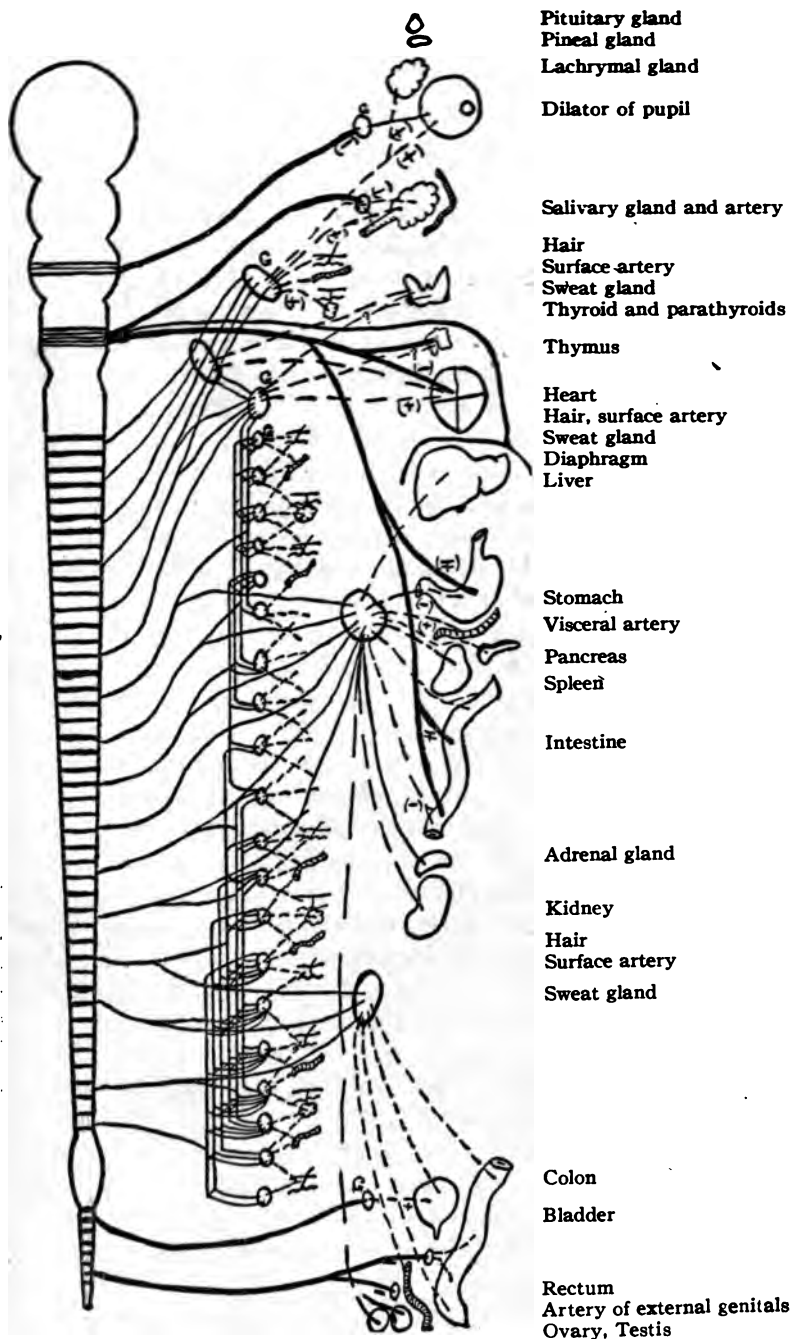
4. The sacral sympathetic—arteries of rectum, anus, and external generative organs, muscles of external generative organs, walls of bladder and urethra, walls of descending colon to anus.

Cannon's autonomic system is virtually similar to Herrick's except that he includes his mid-brain sympathetic and bulbar sympathetic under the term of cranial autonomic.

Higier includes in the sympathetic or vegetative nervous system all nerve fibers which supply the secretory parts of glands as well as automatically acting organs having a smooth musculature.

The autonomic apparatus, in this study, is considered to include the digestive system with its secretory glands and the liver for the intake, assimilation, and storing of energies (glycogen) and the elimination of waste products; the entire circulatory system and the kidneys and sweat glands for the circulation of working supplies and the elimination of endogenous waste products; the respiratory system for the necessary intake and elimination of gases; the sex organs and pituitary glands for reproduction and growth of the body; the glands of internal secretion, such as the adrenals, thyroid, parathyroids, for the regulation of metabolism in emergencies and otherwise; the unstriped parts of the skeletal muscle cells which maintain the postural tonus of the muscles and contribute largely to the expenditure of energy and production of body heat; the tear glands and muscles of the iris. These immensely complicated systems are all woven into one functional apparatus by the autonomic nervous system and it includes all the vital organs except that part of the cerebrospinal nervous system which coördinates the projicient functions of the organism.

The autonomic nervous system may be said to be composed of (1) a double series of ganglia lying along the spinal column and near



the viscera, which they enervate, and ganglia in some of the viscera, and also of (2) a series of autonomic centers that lie within the cerebrospinal nervous system proper. Through this latter group of centers the autonomic and cerebrospinal systems effect a regulatory control of one another. (See Figure 1.)

Physiological research has shown that, as summed up by Cannon (4, p. 34), "*when the mid-part meets either end-part in any viscus their effects are antagonistic*." Thus the cranial supply to the eye contracts the pupil, the sympathetic dilates it; the cranial slows the heart, the sympathetic accelerates it; the sacral contracts the lower part of the large intestine, the sympathetic relaxes it; the sacral relaxes the exit from the bladder, the sympathetic contracts it." Higier and others have also emphasized the importance of this mechanism.

In a physiological sense the course of activity of the viscera is to be seen as a *resultant* of opposing forces in which must be recognized the possibility of unhealthful *conflict*.

This mechanical principle is found consistently throughout the organism wherever two afferent neurones converge for the control of a final efferent path, or where two or more great neurone systems converge for the control of a general effecent path, as in the control of the heart rate, blood pressure, respiratory rate, muscle tonus, overt movements, etc.

As Sherrington (1, p. 178) has expressed it, "At any single phase of the creature's reaction, a simultaneous combination of reflexes is in existence. In this combination (1) *the positive element*, namely, the final common paths (motor neurone groups) in active discharge, exhibits a harmonious discharge directed by the dominant reflex arc, and reinforced by a number of arcs in alliance with it." "But there is also a (2) *negative element* in the simultaneous combination of reflexes. The reflex not only takes possession of certain final common paths and discharges nervous impulses down them,

FIG. 1. (From Cannon.) "Diagram of the more important distributions of the autonomic nervous system. The brain and spinal cord are represented to the left. The nerves to the skeletal muscles are not represented. The preganglionic fibers of the autonomic system are in solid lines, the postganglionic in dash-lines. The nerves of the cranial and sacral divisions are distinguished from those of the thoracico-lumbar or 'sympathetic' division by broader lines. A + mark indicates an augmenting effect on the activity of the organ; a — mark, a depressive or inhibitory effect." The thyroid, parathyroid, thymus, the kidney, pituitary and pineal glands, the organs of reproduction, and the diaphragm have been added by the author to complete the conception of the autonomic apparatus as used in this monograph.

but it takes possession of the final common path whose muscles would oppose those into which it is discharging impulses, and checks (inhibits) their nervous discharge responsive to other reflexes. *This negative part of the field of influence of the reflex is more difficult to see, but it is as important as the positive to which it is indeed complementary.*" (This physiological principle, as will be shown, is also to be seen in the wish to go from "here" to "there," to choose "this" instead of "that," and to compare and discriminate "why," "how" or "what" a thing is from "why," "how," or "what" a thing is *not*.)

There is still a tendency to classify organs and diseases according to location or physical appearances instead of functions, as in the easier scientific methods preceding the acceptance of Darwin's theory of evolution. Considerable resistance still exists towards recognizing that the cerebro-spinal autonomic centers should be grouped as the central division of the autonomic apparatus around which has been constructed, as the autonomic apparatus developed, the cerebro-spinal projicient system for the purpose of mastering the environment. Like the vagus centers in the medulla, they are virtually autonomic ganglia imbedded in superimposed projicient nervous tissue. This constructive tendency is to be seen at present in the comparatively rapid growth of the neopallium in man.

In the biological forms previous to the evolution of a projicient sensori-motor system the autonomic apparatus was submerged in an environmental medium which brought to it the supplies necessary for metabolism. This hazardous dependence of living tissue upon the fates of nature has been gradually reduced as a compensatory working system has been evolved about the autonomic apparatus. This apparatus virtually submerged itself within its own tissues and built up a complicated medium through which it might project itself to master the environment. Man has made another step forward in this same direction of assuring his autonomic comfort by constructing with machinery a protective environment within the larger environment. Civilization is the result of the incessant striving of the autonomic apparatus to extend and refine this sphere of influence.

In the behavior of all the vertebrates we see constantly the tendency of the autonomic system to develop, or to sacrifice if necessary, the projicient sensori-motor system in order to save itself. One might say that practically the entire striped muscle apparatus, which excludes the cerebellum (a ganglion built up on the unstriped muscle cell or autonomic component of the striped muscle cell), may be extirpated without the total disintegration of the organism,

whereas if any division of the autonomic apparatus is entirely destroyed the animal dies.

Long after the autonomic apparatus had constructed a means by which it could manipulate itself about in the environment the tendency to protect its reproductive functions (the welfare of the species follows the safety of the individual) became manifest and instead of ejaculating the spermatozoa into an environmental medium which by chance might enable the impregnation of the ovum a semi-direct means of reaching the ovum was evolved. As "life" climbed up the spiral plane of organic, really autonomic, evolution any tendency to repression has been met with dread and rage. The most potent cause of revolution in the society of man is affective or autonomic repression, usually due to the usurpation and waste of economic necessities and sex. But sex still follows the necessities of life and may prostitute itself in order to secure them (5).

In reviewing the architecture of the human machine the tendency of the autonomic apparatus to sacrifice the cerebro-spinal apparatus in order to save itself was emphasized. This principle has been neatly demonstrated by Langfeld in a series of studies "On the Psychophysiology of a Prolonged Fast" (6). The tests (1) rote memory for words, (2) tapping test, (3) strength test, (4) tactual space threshold, (5) touch threshold, (6) free association and reproduction reactions, (7) association reactions, genus species, (8) association reactions, noun-verb, (9) cancellation test, (10) handwriting, (11) visual acuity, (12) memory for words after 55 minutes, were made daily during a period of thirty-one days of fasting, during which time the individual consumed only 750 c.c. of distilled water daily. "The tests depending most on the muscular reactions, *i. e.*, the strength test showed a falling off" (6, p. 48). All the tests involving the higher process of attention, perception and association showed improvement which may be seen as a compensatory coördination of the acquisitive faculties as the muscle powers weakened. Skill, being intimately dependent upon postural muscle tonus, is influenced by the autonomic cravings. The capacity for improvement of the autonomic control while the capacity for overt movements diminished indicates that the organism tended to consume the resources of energy in the projicient motor system first. The capacities of coördination of movement are retained longest, being probably more necessary for success than mere muscle strength when the food supply is difficult to attain. Species that have very accessible and abundant vegetable food supplies develop enormous bodies with a relatively meager integrating nervous mechanism.

Apparently skillful or elaborate motor coördinations are not essential to the welfare of most protected herbivorous animals such as the rhinoceros. Carnivorous types have developed, relative to their body weight, far larger and more intricate projicient nervous systems because the nature of the food supply required a higher degree of skillfulness.

Gaskell (45, C. 1) in his brilliant discussion of the origin of vertebrates from invertebrate forms of the sea-scorpion or sipder type, has advanced the theory that since the esophagus pierced the anterior portion of the nervous system, as the nervous system grew the esophagus became constricted until only liquid food (blood) could pass, and as the nervous system continued to grow and constrict the esophagus more and more the formation of a new alimentary canal became urgent for survival. He summarizes the dynamic principle in this romantic biological revolution as follows: "Further upward evolution demanded a larger and larger brain with ensuing consequence of a greater and greater difficulty of food-supply. Nature's mistake was rectified and further evolution secured, not by degeneration in the brain region, for that means degradation, not upward progress, but by the formation of a new food channel, in consequence of which the brain was free to develop to its fullest extent" (45, p. 66). This explanation of the revolutionary process that occurred admits that another solution of the dilemma would have required only sufficient degeneration of the nervous system to enable the esophagus to pass the food to the stomach, but he says this would have meant degradation and not upward progress. The autonomic apparatus in itself cares nothing about the morals of upward or downward evolution, and one cannot help but wonder why a scientist with such acumen should care to inject a dynamic supposition having only a moral value. Its one law is to fulfill its biological career, that is gratify its cravings, and upward evolution, in the sense of greater skillfulness in its projicient functions, is the result of the requirements of the environment. When no skill is necessary the integrative functions tend to atrophy through disuse. Hence the moral attributes of upward evolution must be recognized as results of the nature of the autonomic struggle and not as causes. No further dynamic principle need be assumed than that of distress in the peripheral sense organs of the autonomic apparatus to explain why the nervous system was increased and finally almost occluded the esophagus, even though it meant death for the organism because of the vicious circle that was established. It was not for the sake of upward evolution and the development of a larger brain that "Nature

made a mistake" but the increase of the brain was due to the necessary, desperate efforts of the autonomic apparatus to develop a more efficiently integrated projicient nervous system in order to catch its prey. Such biological dilemmas have probably exterminated many species. The invertebrate types in which this biological revolution occurred were blood suckers. It is probable that at one time the food supply was so enormous that the carnivorous sea scorpion learned to relish only the blood of its victims and its digestive secretions specialized considerably for that type of food. As the quantity of victims gradually decreased more skillful efforts were necessary, hence more intricate integrations and more numerous association fibers in the projicient nervous system were developed and with extra effort sufficient blood could be obtained. Then probably a still greater decrease in the food supply occurred, and as the brain had become too large to permit the esophagus to pass solids desperate efforts had to be made to catch sufficient prey for the blood supply. This necessitated a progressive increase of the nervous system as the only immediate solution of the danger of starvation. In the end, however, this was doomed to defeat its own purpose because of the mechanical principle involved and it can hardly be regarded as "a mistake of Nature."

Eventually the increasing projicient nervous system constricting the esophagus made the formation of a new alimentary system imperative because a decrease in the nervous system made the animal too inefficient to capture enough prey and the necessary continued increase in the nervous system threatened to constrict the esophagus entirely. It has been shown that when rats are inbred, reducing the brain weight, they learn less rapidly to make associations than their brainier ancestors (Bassett, 49). That the dynamic pressure for an increase in the size of the brain should have its *source* in the peripheral structures of the autonomic apparatus has been discussed at some length in order to emphasize the principle that the dynamic urge of evolution must have a strictly metabolic origin and has no structural preference. The structures evolved are sustained only because they are the best means under the circumstances for the retention of a comfortable autonomic state.

The body is a vast community of cells, each one living an individual existence but dependent upon and reciprocating with all the others in a complex unity. The specialized cell types have collected into colonies or organs and systems, and the reciprocating systems into a functional and structural unity, but the underlying plan of evolution of the cellular unity has always been directed by the auto-

nomie needs of the organism, as they were imposed upon the autonomic apparatus by the environment and by metabolism.

Very early in the embryonic development of the human organism, before striped muscle cells and cartilage or bone-forming tissue appear, a circulatory system is started (for distribution of food—the first circulation developed being associated with the yolk-sac), and soon after the heart an autonomic (vagus) nerve cell or center appears. As the spinal cord evolves, the peripheral autonomic ganglion colonies emigrate from the spinal cord segments. The autonomic centers within the cord and, particularly in the medulla, are far enough developed to support the inference that, like the development of the cerebrum on the distance receptors, the cerebro-spinal system is developed upon a nucleus of the central autonomic sensori-motor system. It would be expected that the final construction of the two systems would proceed together and regulate one another. The point to be emphasized is the priority of the autonomic apparatus over the projicient apparatus. The unstriped muscle cell appears before the striped muscle cell.

This brings us to the problem of the peripheral origin of autonomic distress, the peripheral origin of the affections or emotions, their persistence in the postural tensions of the viscera and their relation to the receptors manipulated by the projicient apparatus. Part II is devoted to a discussion of these mechanisms.

PART II

FUNCTIONAL CONSIDERATIONS OF THE THEORY

The Significance of the Continuous Activity of the Proprioceptive Circuit

The continuous activity of the afferent proprioceptive arc of the skeletal and visceral musculature has been demonstrated by Sherrington (7, p. 196-7). He found that when all the nerves of the muscles of both hind limbs in a decerebrate cat are severed, including all the nerves from the skin, except the nerve of the muscle whose tonus is to be studied (extensor muscle of the knee), that muscle retains its full tonus. This nerve of the tonic muscle contains both efferent and afferent fibers, the latter being traceable from receptors in the tendon of the muscle and, mainly, from the muscle itself to their entrance into the cord via the dorsal (posterior) roots of the fifth and sixth spinal nerves of the lumbar segment (in the cat). "If these two afferent dorsal roots are severed the tonus at once vanishes from the muscle, although the corresponding ventral roots containing the motor fibers for the muscle remain intact, and although all the other nerves of the limbs remain intact as well." Experiments with other muscles exhibiting tonus demonstrated the same phenomenon and the maintenance of tonus seems to be an attribute of all the skeletal muscles that oppose gravity, thereby sustaining the posture of the animal. This probably includes all the skeletal muscles, except the abdominal, which "prevent sinking to the ground."

He also found, although the muscle was *shortened or lengthened* by changing the posture of a limb (extension or flexion), that the tonus remained constant. It does not interfere with the reflex movements which might be superimposed upon the tonus as demonstrated by Langelaan (8).

Sherrington (7, p. 202) considers that the tonus of skeletal muscle in the mammal is nothing more than postural contraction; both are reflex functions. Tonus is a contraction of muscles engaged in the execution of a definite coördinate reflex, a reflex differing from reflexes ordinarily examined only in that its functions are posture and not movement. The reciprocal inhibition of antagonists

for posture have also been demonstrated; as "in reflex standing the opponents of the posturally contracting anti-gravity muscles, the flexors as they may in brief be termed, exhibit no postural contraction, and the stronger the reflex posture the less trace of contraction may these latter be expected to show."

The proprioceptive system as shown by Sherrington is necessary for the maintenance of postural tonus, and also it is indicated, by the mechanism of maintaining tonus, that the sensations (kinesthetic) acquired through the activity of the proprioceptive system, in turn, depend upon the contractural states of the muscles and tendons in which the receptors are imbedded, the positions of the joints, and, perhaps, skin pressures. Therefore *the proprioceptive arc, functionally a circuit, must be considered in its entirety, including the muscle or gland cell, in relation to kinesthesia.*

Postural contraction, like other contraction, is only present in response to nervous impulses reaching the muscle from the motor neurone, but the tonic function of the efferent motor neurone depends largely upon the intact afferent arc. The action currents, Sherrington observed, vary from 40 to 90 per second for various muscles, and under different conditions (7, p. 230). These action currents, producing an almost ceaseless, very rapid stream of proprioceptive impulses, may explain the continuity of the kinesthetic content of the stream of consciousness. Its continuity is accepted by the thinker because the proprioceptive impulses flow from manifold sources so rapidly that they can not be differentiated into their elements except when particular divisions of the proprioceptive system have attained especial activity, becoming more prominent and vivid than the mass of other proprioceptive circuits. For example, when threading a needle while seated one would not likely be aware of the functions of the leg unless the leg divisions suddenly had undue stresses imposed upon them. Then the delicate neuromuscular coördinations of threading the needle would tend to be dissociated and cause a general momentary discomfort because the slight incoördinations of the hands resist the affective functions or wish.

The continuous activity of innumerable proprioceptive circuits also explains the apparently unlimited depth of the stream of activity of a personality for any moment, shading from the predominant proprioceptive functions of the moment, of which the individual is clearly aware, to functions of which he is more or less dimly aware, into the mass of neuromuscular functions for which he may not have or can never have consciousness. This seems to be the physiological nature of the apperceptive functions of the personality.

It has been shown in many observations that other receptors than those of the contracting muscles themselves can influence the reflex postural action maintained by the proprioceptive arc of the muscle. Ewald, quoted by Sherrington (7, p. 206), split the lower portion of a pigeon's bill into its two lateral halves and found that the destruction of the right labyrinth weakened the postural contraction of the right half much more than that of the left, the right half not being able to support as much weight as the left half.

That the proprioceptive circuit is influenced by the exteroceptors is maintained, after demonstration, by Sherrington (9, p. 472-473). He says "*the reactions produced by the receptor organs of the deep field (proprioceptive) are results primarily due to the stimulation of the organism by itself, but secondarily due to the stimulation of the organism by the environment,*" that is, *through the exteroceptors.*

The proprioceptive reflex "*allies itself in its effect to the primary reflex excited from the exteroceptive surface and reënforces it,*" or it may oppose the effect of a conflicting exteroceptive stimulus. For example the flexion reflex of the hind limb of a dog can be elicited by an adequate stimulus applied to either the skin of the foot or the afferent nerve fibers of the flexor muscles themselves, or by the synchronous *subliminal* stimulation of both afferent (extro- and proprioceptive) nerves. These stimuli mutually reënforce stimulation of the afferent nerves of flexor muscles of the opposite leg. Later the proprioceptive reflex restores the comfortable *posture* of the limb which the exteroceptive reflex has disturbed. The proprioceptors evoke a *compensatory reflex* in the opposite direction to the reflex excited from the skin, the exteroceptive surface. Langelan (8, p. 330) agrees with this conception of the relations of movement to posture; "the tonus, the tendon reflex, and the clonus are closely allied phenomena; and they are composed of an element, 'contraction,' due to the action of the motor cell of the anterior horn and by an element 'plasticity' ('autonomic tonus'), due to the action of the sympathetic motor cell of the cord. *In tonus the autonomic component prevails. In the tendon reflex the twitch dominates the tonic contraction.*"

Sherrington's researches indicate that the activities of the proprioceptors are indirectly but primarily under the control of the autonomic nervous system, and, although he does not specifically claim that the affective state regulates postural tonus, he mentions the frog's sexual clasp and catatonia, phenomena that may be considered as being caused by an affective state, as examples of unfatiguability of postural tonus. Every intelligent individual is

aware of the weakening influence upon his muscle tonus when something causes a hopeless fear and on the other hand, when his anger is socially justifiable, his postural vigor is tremendously increased. The compensatory affective state is surely reënforced by the postural skeletal tonus, but the affective tension has its origin in some viscus because the phenomenon of reflex change in postural tonus instantly follows affective repression; as, when one holds a cigar in a light postural grip and suddenly, upon repressing or concealing an emotional reaction to a situation, a momentary postural relaxation occurs and gravity pulls the cigar from the fingers. Such phenomena can only be explained as a change in postural tonus following a change of affect. Langelaan (8, p. 338) and DeBoer and Mosso (7, p. 231) maintain that the state of postural tonus is regulated by the sympathetic or autonomic innervation of the striped muscle cell; whereas, G. van Rinjberk¹ and J. G. Dusser de Barenne² argue against Sherrington and DeBoer, maintaining that there is no distinct evidence that the striated muscle has a second innervation of sympathetic origin which regulates its tonus.

The explanation, that postural tonus of skeletal musculature is determined by the autonomic component, is the only theory, so far given, that satisfactorily accounts for the effects of fear, shame, sorrow, rage and love upon postural tonus.

The dual nature of the striped muscle cell and the dependence of its postural tonus upon the influence of the autonomic component supports the conception that *the activities of the autonomic sensorimotor apparatus are projected into the functions of the skeletal muscular system and are in turn reciprocally reënforced by them*. The angry man or savage tends to work himself into a greater state of anger by cursing, yelling and clenching his fists, and making threatening gestures and perhaps punishing himself. The general tonus of his skeletal muscles becomes considerably increased and he cannot handle a delicate instrument while in that physiological state, although he can fight better.

On the other hand one may check the wave of anger, if its stimulus is not too severe, by making a few distracting movements, smiling, etc. (As "when angry count ten before speaking.")

The important features of the functions of the proprioceptive circuit of the skeletal musculature for psychology are that its activity is virtually continuous, occurring automatically and contributing to the most fundamental functions of the personality; that the degree of its vigor is determined by the autonomic component; that

¹ Arch. de Physiol., 1917, 1, 257-261. Physiological Abstracts, 906.

² Pflueger's Archive, 1916, 166, 145-168. Physiological Abstracts, 1638.

it is capable of reciprocal inhibition and reënforcement; and that the subliminal stimuli, which may be proprioceptive or a mixture of proprioceptive and exteroceptive stimuli, may combine to produce a reflex, or inhibit one another and prevent it.

Sherrington observed (9, p. 473) that "the reflex due to the exteroceptive surface is reënforced by the appropriately chosen proprioceptive reflex" or may be inhibited by an inappropriate posture. This probably explains the psychophysiological process of attention, of indifference, of study, etc. When an individual is coördinated for any length of time on a particular course of study he distinctly feels himself to be maintaining a characteristic tonus of his skeletal muscles. We can usually see distinct characteristics in the bodily carriage or posture of the professional soldier, sailor, clerk, minister, physician, or plowman, the confirmed criminal, dementia præcox, the indolent, ignorant, refined, hateful, timid or bold.

When affective fixations occur and individuals "get set" on a postural course like the exalted, persecuted, paranoiac, or catatonic, or agitated melancholic, it is extremely difficult to divert them from their course, that is, break through the stereotyped proprioceptive stream with an exteroceptive distraction. Modern psychotherapy usually tries light forms of fascinating occupation. Often an autonomic or affective shock like pneumonia, appendicitis or the death of some intimately involved person will be followed by an adjustment; particularly is this true in depressions.

Pulling oneself together in order to study, or relaxing for light reading, is obviously dependent upon postural muscle function because the postural tonus of the muscles contributes the kinesthetic content of consciousness, and by lowering the resistance to subliminal exteroceptive stimuli of a certain order (the subject of study) our apperceptive reactions are greatly extended. We are well aware of postural tensions as we "get into form" for purely motor coördinations, as a stroke at a golf ball, and when we get into a "studious" posture, we may safely assume that a similar physiological procedure has also occurred.

Since the functions of apperception are at all times necessary for the understanding of oneself, the behavior of living objects, or the nature of lifeless objects, attention is called to the functions of postural muscle tonus and the stream of kinesthetic imagery for the explanation of the physiology of the apperceptive functions.

Apparently we may have such changes in the postural tonus as reciprocally increasing or decreasing tonus between the flexors and extensors, pronators and supinators, abductors and adductors of

a limb or several limbs without overt movement of the limb; as when one makes his arm give him the sensations of wielding a tennis racket without going through visible movements; and as the sensations of such movements are made more vivid the overt movements begin to appear.

This may be the mechanism of understanding the behavior of others—that is, by miniature tonal forms of reflex reproduction of the movements of others, the proprioceptors, giving the appropriate kinesthetic sensations, enable the personality to become aware of the significance of the posture and movements or behavior of others. Children spontaneously, unconsciously imitate others to learn, imitate sounds, the movements of animals, a speaker, teacher, playmate, machinery, when they are trying to get the full significance of the thing observed. We tend to reproduce another's movements when we describe conduct, adults often imitate facial expressions to understand faces of others, our facial muscles tend to reproduce the facial expressions of our associates. If the reproducing movements give us unpleasant kinesthetic sensations we tend to avoid those persons. It is extremely difficult to prevent the facial muscles from reacting to the facial expression of an angry person. Friends tend to weep and sing together. This imitative mechanism precipitates the stampede and the mob. Its speed and accuracy of working is to be seen in the darting and leaping of a school of fish or the flight of a swarm of bees, or flock of birds.

The more clearly we are able to reproduce another's behavior or facial expression the more accurately we understand its significance. An Indian best understands the Indian. The postural and personal characteristics are revealed in such phrases as "square jaw," "stiff upper lip," "eagle eye," "no backbone," "mincing step," "a Miss Nancy," etc. When we try to recall an experience we assume a characteristic attitude as we direct our attention to the postural imitations of the experience.

Frequently in making explanations we find ourselves, when lost for words, going through explanatory movements which are not desirable under the circumstances and may even be embarrassing. The art of the stage is founded entirely on the physiology of inducing the people in the audience to forget themselves in order that they may give themselves up to their imitative tendencies and reproduce the feelings, and, in miniature, the behavior of the actor. The actor who succeeds in this seduction is applauded for his effectiveness. But when his movements are incongruous the observer feels the incongruity and a conflict in his tendencies to follow the actor or his own desires.

Furthermore the facial expressions of anger, pleasure, disgust, deception, sincerity, etc., are really *not intuitively* understood, but seem to be *reflexly* understood because of the *reflex imitation through similar brief muscle tensions* which give the necessary kinesthetic or proprioceptive sensations upon which our understanding is based.

The degree to which the postural changes of muscles must take place in order to explain the lightning-like quickness of thought and its bewildering complexity may seem rather contradictory particularly in such instances as abstract philosophical or mathematical discussion. The bases for such forms of thought lie perhaps in the motor functions of the speech apparatus and the muscles that move the eyeball, the head and the hand. Compléxes of extensive bodily movements may be represented by abbreviated motor functions in these muscle groups.

Sherrington (7, p. 209) states that the extrinsic muscles of the eyeball are preëminently postural in their functions.

The peripheral dependence of postural muscle tonus upon the proprioceptor, constituting the source of kinesthetic imagery, indicates that in a certain sense *we think with our muscles*. This is another contribution to the conception of peripheral instead of central origin of "thought." The rather universal assumption as to the central origin of thought, that the "mind" or consciousness is in the frontal region of the brain, is probably due to the dominating activity of the visual receptors and their extrinsic muscles, causing most of the content of consciousness to have its source in the upper, front part of the head. The nature of the *content of consciousness* is probably entirely determined by the activity of our receptors, and the greater part of the receptor field is the proprioceptive from which arise the kinesthetic sensations of movement. The content of consciousness may therefore be compared to a complicated moving picture of vivid and dim figures which are all made of black dots, and, as the black dots are shifted in their arrangements and intensity, the picture changes. Let us assume that each receptor in the body is represented by a dot, and the vigor of the receptor's activity is represented by the vividness of the dot. Then, as the various receptor fields become associated together or dissociated in their afferent contributions, the content of consciousness becomes changed.

This is virtually saying that we think with our muscles, because the kinesthetic impulse (dots) arising from the embedded proprioceptors are much more numerous than all the others. For example,

if we allow ourselves to become aware of the visual image of a moving automobile, the awareness of its movement is furnished by extrinsic muscles of the eyeball as they shift the image by shifting their postural tensions. Overt movements are not necessary unless we desire a very vivid image, then, also, the muscles of the neck may contribute by moving the head. If the image of the moving automobile is one of ourselves pushing it, then the muscles of the body come into play to furnish the images (receptor dots) and, if it is to include pushing it through a cold, wet, muddy road, the sensations of coldness and wetness arise from the tactile receptors of the skin of our legs. If the description of the experience includes the reproduction of an accident (say slipping), we feel the image of the movement of the slipping in our legs first, and the remainder of the body then adjusting and coordinating to the change of posture. (The reader must discriminate between the printed word-images of the automobile incident, as he reads, and the visual-motor images.)

The postural motor tensions of our striped muscles contribute the kinesthetic impulses or images of movements that reproduce the experience. If we cannot reproduce the experience we cannot recall it, and those who have not had the experience of hearing or seeing a savage playing a "botabo" are unable to become conscious of anything more than a vague, indefinite picture, because they cannot grossly reproduce the movements and weird rhythms. But if someone should speak of a small boy playing "In the Good Old Summer Time" on his mouth harp, we quickly get vivid visual, auditory and motor images of it.

It may be contended that should an individual lose a limb or group of muscles he loses part of his psychic personality. This would probably be found to be the case on minute analysis of his psychic functions but no gross changes may be observable because the remaining muscles that had been adjusting to the special activities of the formerly intact group may almost completely supply the deficiency, as in adjusting to walking with an artificial foot. The manifold primary adjustments of various parts of the body to a single object like a pencil and the secondary adjustments to one another, enable us to learn about the pencil in numerous ways besides through the eye and hand. Hence with the loss of the eye and hand knowledge about pencils is partly, though not ostensibly, lost.

Watson (10, pp. 430-431) found that the behavior of rats was little disturbed by the loss of the visual, auditory, and olfactory receptors. This obviously applies to kinesthetic memories of mazes but the loss of sense organs or limbs would greatly interfere with learning new problems and competitions.

The Autonomic Component—Postural Tonus of the Unstriated Muscle—Its Influence on the Striated Muscle

Sherrington's work on the proprioceptive circuit has finally *compelled* the inclusion of the effector muscle cell or secretory cell as an indispensable factor or organ for the circulation of energy in the autonomic apparatus, since the autonomic motor (efferent) neurones are greatly influenced (stimulated or depressed) in their activities by the afferent current from the proprioceptors which, in turn, are aroused by the muscle cells' activities, making an efferent-afferent-efferent circuit, and so on. His work on the postural tonus of the hollow viscera and vascular system has demonstrated that they must contribute an enormous, continuously circulating stream of autonomic activity to the personality, and this mechanism supports the conception that the autonomic functions are in themselves the dynamic component of the personality, as the following experiments show.

Mosso and Pellacini (cited by Sherrington, 7, p. 215) observed that the bladder in a dog could hold at even close intervals different volumes of water ranging from 10 c.c. to 90 c.c. at the same intravesical pressure. They concluded from their experiments in man that an *intravesical pressure of 18 cm.* was accompanied by a desire to micturate; and "they point out that the stimulus exciting desire to micturate is closely related with intravesical pressure but not closely with the quantity of bladder content; *i. e.*, bladder volume." They found also that the capacity of the bladder to adjust its pressure to increase or decrease of content was very rapid and did not depend upon the quantity of fluid it contained. A quantity of fluid injected into the bladder would *cause desire to micturate when the pressure arose over 18 cm.* but if the fluid was retained the pressure soon fell to below 18 cm. (water) *and the desire disappeared.* (In voluntary, prophylactic micturition the abdominal muscles are contracted, the intravesicular pressure is thus increased and the desire to micturate is then felt.)

Sherrington compares (7, p. 217) the light grip of the bladder wall on the fluid contents to the hands gripping a ball and says their possible functions are "analogous." In the case of the bladder its postural tonus depends, it seems, upon the intravesicular contents arousing different stimuli which in turn cause the posture of the bladder to change sufficiently to lessen the intravesicular pressure and diminish the stimuli. *The relation of postural vesicle tonus and the peripheral genesis of a desire has been experimentally demonstrated.*

"Direct observation" Sherrington says (7, p. 219) "shows the ability of the fundus (stomach) to adjust suitably its postural contraction in the case of diminishing content" and also in increasing content. Although this power is present in the excised organ it is less ample and less perfect than under natural conditions.

Grey (50) draws the following conclusions from his experiments on the postural activity of the stomach: "the normal stomach possesses a striking capacity for adapting its size to the volume of its contents with only minimal changes in intragastric pressure. This capacity disappears only shortly before the viscus ruptures." "The extrinsic nerves have nothing *directly* to do with the postural configuration of the viscus. The mechanism responsible for these changes concerns *solely* the musculature itself, together with the *intrinsic nervous mechanism*"—that is, the nerve cells imbedded in the gastric walls. (Italics inserted.) Grey's experiments demonstrate the surprising degree of independence the stomach has for regulating its own postural tensions, hence its semi-independence as an affective source, influencing the remainder of the organism to adjust to it.

Sherrington (7, p. 222) compares the auricles of the heart to the fundus of the stomach and the ventricles to the pylorus, and regards the auricles' variation in capacity at different times as a function of postural tonus. He holds also (7, p. 223) that in arterial vessels, when they accommodate to the posture of the body and maintain a fairly constant pressure upon the changing volume of the contents, as in the horizontal and erect position of the body, the postural tonus is analogous to the postural function of the bladder or stomach.

The relative *unfatigability* of postural tonus "is often extraordinarily great" (7, p. 226). Sherrington has observed postural contraction in the decerebrate cat to last for six days and includes the embrace posture of the male toad and *cataleptic postures* in psychoses as phenomena of postural tonus.

In the postural tonus of the bladder we find a definite example of the physiological functions of a division of the autonomic apparatus *generating a desire by producing peripheral sensations*, which in turn dominate the behavior of the organism, exhibiting clearly *a dynamic influence of peripheral origin that determines the activities of the personality*.

Phenomena of excessively repeated acts of micturition in psychoneuroses indicate that a mechanism exists which may cause the bladder to maintain a fixed tonus so that when the vesicular contents reach a certain quantity an intravesicular pressure causing a

desire occurs. *Such spastic states of viscera, psychoneuroses show, dominate nearly all other interests of the organism or personality when they exist.* Langelan (8, p. 331) makes the encouraging suggestion that perhaps certain types of convulsive seizure and some progressive myopathies are related to the autonomic component, and Sherrington includes the cataleptic postures, which may endure for months.

Since the proprioceptive arc must be *continuously* active in order to maintain the postural tonus of the bladder, it is necessary to assume that, so long as the individual is unconscious of the activities of his vesicular proprioceptive system, these activities are not intense enough to arouse the reactions of the organism as a whole. When they do become intense enough to cause the entire organism to make an adaptation to the dominating activity of this segment, namely, in the preparation for, and in the act of micturition, then we have a distinct physiological function, which is, in a definite sense, different from the previous subliminal functional state, and which causes a compelling craving to micturate; that is, a wish.

In this instance the phenomenon of *awareness or consciousness occurs when the body as a unit must adjust itself to the special or dominating activity of one of its parts.*³

If it is true that the proprioceptive arc is necessary for the maintenance of the postural tonus of visceral muscles, and these muscles in turn stimulate the intramural receptors of the afferent arcs, and the circuitous flow of energy is practically continuous, although varying in its rapidity, then we have at last a satisfactory physiological basis for the conception that from each visceral division flows a continuous afferent stream of subliminal stimuli (feelings), reciprocally though, perhaps, indirectly influencing the functions of the other organs separately as well as collectively. And, further, when the postural tension of a division or an organ, like the bladder, stomach or genitalia, is increased to a greater degree than the tensions of the other organs, the afferent, sensory flow from this organ or division dominates the afferent flow of the remainder of the group, thereby dominating the behavior of the animal, i. e., to apply this principle to man, the nature of the hyperactive viscera determines the nature of the affections or wishes that we are conscious of and explains the fact that we are never directly dominated by purely one emotional craving or one wish. Our wishes are all more or less active.

It is much more practical and satisfactory for the psychologist

³ This explanation of consciousness of self and of the environment will be later referred to more fully.

and psychopathologist to work with a hypothetical conception of the personality that considers it an interwoven continuous stream of affective cravings, of unfathomable depth and numerous shades of aversive and acquisitive tendencies toward the world as it is constituted for that personality; some cravings reënforcing each other, some repressing each other, some overcompensating for the deficiencies of others; all, more or less actively, striving to attain the control of the personality in order to acquire satisfactory stimuli through the adequate exposure of appropriate receptors.

To present the same conception concretely we must learn to see the living, working body as a complex unity because of the individual importance of the postural tensions of each autonomic division, the salivary glands, stomach, liver, intestines, rectum, diaphragm, heart, lungs, kidneys, bladder, prostate, genitalia, etc., all, more or less vigorously, striving, at times quite independently, with one another, to dominate the final common projicient motor paths, in order that the exteroceptors will be exposed to stimuli which give satisfaction. (See Fig. 2.)

The nature of the afferent stream emanating from a diseased, or an organically inferior, or an organically superior organ, or from a repressed, or an excessively used organ, modifies the relative importance of the afferent contributions from the other organs and may seriously interfere with the personality's general development and comfort. For example if a woman whose organic constitution is unusually voluptuous, who cannot avoid having incessant, vigorous cravings for maternity, is married to an impotent, unambitious man, although organically constituted for prolific reproduction and happiness, she must suffer incessant anxiety because she is bound by society to avoid living naturally. The potent-husband-and-frigid-wife dilemma, and the reverse, are among the most persistent to be met with in social problems.

The above hypothesis explains how the increased postural tonus of an important viscus may be the source of a persistent afferent stream of nervous impulses (feelings to act) which are intense enough to entirely dominate the other affections for a period of time—such as a particular postural tonus of the rectum and its sphincters which would compel preparations for defecation. Psychotics, who feel they must defecate but cannot (this I have observed to continue for several months), show the most intense distress and inability to become interested in anything else.

If it is possible, as psychotics abundantly indicate, and those who recover through a psychoanalysis substantiate, that instead of a brief period of distressing posture of a viscus the posture may be

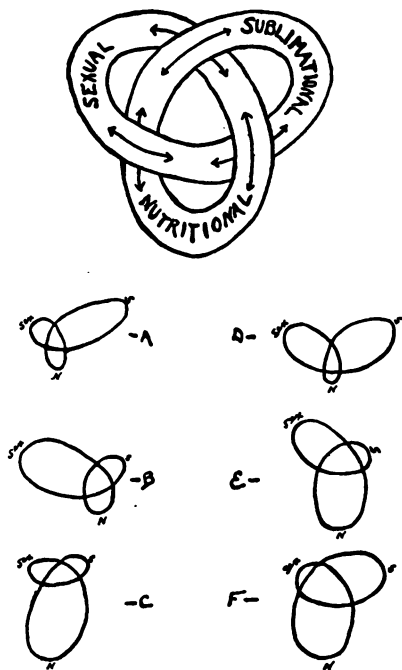


FIG. 2. This diagram represents the continuity of the energetic stream flowing through nutritional, sexual and sublimational functions of the personality. At no particular point does it have a beginning or an end. The large figure represents the healthy, happy, well-balanced, progressive, constructive, virile personality. He is so constituted because, being free from serious affective repressions, he lives a well-rounded-out biological career. This, the most general type, is the most difficult to maintain throughout the struggle for potency. (Comfortable potency exists in proportion to the successfulness of the compensation for fear.)

The smaller figures represent the six different general types of eccentric deviation from the normal that may occur because of organic inferiority, as in the idiot (*C*) or excessively fecundating moron (*E*); or because of functional inferiority due to affective-autonomic repression, as in the chronic, profoundly dissociated personality (*C*), or in some prostitutes (*E*). The representations of the six figures are given below. The capacity for extension or retraction in the various directions should be recognized as elastic, varying greatly at different times for the same individual.

A—the undenourished striving, ascetic, paranoid, philosophizing type.

B—the emaciated, autoerotic, demented—organic and functional.

C—the fat, gormandizing, demented—organic and functional.

D—the erotic, inspirational, eccentric manic type.

E—the pimp, prostitute, and fecundating moron type.

F—the comfortable, ascetic, gormandizing, religious type.

sustained for long periods of time, then, probably, we have discovered the elementary physiological foundations for the development of sound and eccentric traits of character. Each individual organ of the viscera, containing an afferent innervation, and each field of distribution of the circulatory system must be considered. The infinite capacity for postural variation among individuals, and the similarity of the psychic productions of individuals possessing similar dominant postural traits seem to be best explained by this hypothesis.

Sherrington (9, p. 474) suggests that "*one function this tonus may serve is that of an adjuvant to so-called muscular sense.*"⁴ "Much of the reflex reaction expressed by the skeletal musculature is not motile, but postural, and has as its result not a movement, but the steady maintenance of an attitude."

A young man carries his hands like his father, another walks like his father, another holds his head tilted toward one shoulder like his father, a daughter tried to have a deformed finger like her father's, another works the muscles of her cheeks, unconsciously imitating her father, internes in hospitals notoriously imitate their chiefs of the staff, students wear their clothes, hats, carry their bodies, facial expression, accent their words, adopt characteristic phrases, moral and social attitudes like those of their teachers or of older, socially potent students. *Postural imitation*, in order to develop a personality like the hero, is the eternal effort of the hero worshipper. Children learn to spit like others, laugh like their playmates, cut their fingers, injure themselves, tear and soil their clothing and adopt countless artifices in order to be like their associates. The influence of associates upon the personality is a physiological mechanism and occurs unconsciously, or at least begins unconsciously.

The tendency to maintain a characteristic setting of the facial muscles, vocal cords, diaphragm, muscles of the thorax, carriage of the body, is apparently traceable to the affective disposition of the individual—"the autonomic component." When the artist wishes to portray a certain affective state, he must paint his figure in a characteristic posture so that the postural imitative reactions of the viewers will give them a characteristic content of consciousness.

Peripheral Origin of the Emotions

That the visceral functions have a fundamental influence on the personality, no one questions, but the nature of this influence has long been a controversial subject for physiology and psychology.

⁴ Italics mine.

Sherrington (II) has concluded that the visceral functions only reinforce the affective state and do not produce it, being secondary to cerebral emotional activities.

A reconsideration of his experiments, however, shows that if the postural tensions of the diaphragm, which introspective analysis indicates reacts significantly to potentially painful or pleasant exogenous stimuli, are given due importance in their reciprocal mechanical influence upon respiration, cardiac contractions and alimentary adaptations, the experiments do not refute the physiological mechanism of James' theory.

Sherrington found (II, p. 389) that spinal transection through the seventh cervical segment, and the section of the vagi above both recurrent laryngeal branches, and of the sympathetic trunks at the same level did not "dull" a young puppy's exhibitions of "joy," "pleasure" and "fear," or an older bitch's reactions of "anger," "disgust," "pleasure" and "fear." The *afferent* and *efferent* nerve supply of the *diaphragm* was left intact. The viscera, which were connected with the autonomic centers in the spinal cord, were exposed to the mechanical influence of emotional changes in the tension of the diaphragm. Through well established habitual and phylogenetic associations these postures may have been a mechanical medium of influence between the part of the animal which was connected with the brain and the segregated part.^{4a} The motor reactions of the muscles of the head, fore legs, larynx and diaphragm (as indicated by the barking and breathing) were typical of "aggressive rage."^{4b} Such violent reactions might have characteristic mechanical influences upon the viscera and surely affect the contents of the great blood vessels. It is not safe to assume that the viscera and motor tensions which were still connected with the brain were not causing consciousness of typical sensations which constituted the emotion, and that the segregated part, when normal, did not greatly increase and reinforce the affective disturbance.

That the autonomic apparatus may be *conditioned* to react to stimuli even during a state of cerebral anesthesia is shown by Sher-

^{4a} It is not established that the operation completely separated the viscera from efferent and afferent influences with the brain although in the dog the connecting fibers between the cervical sympathetic and thoracic sympathetic lie in the same sheath with the vagus and the depressor branch of the superior laryngeal (Sherrington).

^{4b} The method of testing whether or not the spinal dogs showed emotional responses to exogenous cerebral stimuli was to bring appropriate stimuli to play upon the exteroceptors in a natural manner, such as dog's flesh in milk to arouse disgust, scolding to arouse fear, and a cat to arouse rage.

rington's Turin spinal dog (II, p. 393). The cardiac rate and strength and respiration showed marked reactions, of the fear type, to auditory stimuli which had formerly accompanied pain stimuli (faradic current).

James' theory of the emotions maintains that affect producing motor responses to agreeable or disagreeable stimuli occur before the affective reactions are felt, that is, before the emotion as such exists, and, *unless this motor response occurs the emotion does not come into existence*. Therefore, it may be held that the observed motor responses of joy, anger, etc., to the visual, etc., stimulation of Sherrington's spinal dogs were only partial motor-joy, or fear responses, but sufficient to give the dog a characteristic appearance, though not so intense as when the entire system was intact.

The Sherrington argument, in principle, is the same as that which might be made in case the stomach were removed and the animal still digested food and one concluded that the stomach had no digestive functions.

We cannot assume, since part of the organism shows characteristic affective types of motor response to agreeable or disagreeable stimuli, that the isolated or extirpated organs did not have very important or even more important affective functions of a similar nature.

The only manner in which Sherrington's type of experiment could be satisfactorily used to prove that certain or all viscera had no affective influences would be to isolate them from all connections with the cerebro-spinal system and if the individual still felt characteristic affective changes, and no visceral changes could be noted, then we might conclude at least that the motor functions of the isolated viscera do not alone determine the affective reaction of the personality.

Another unsatisfactory point in Sherrington's experiments was the intact diaphragm. The extensor muscles of the fore limbs were connected with the brain and, although the spinal cord from the seventh cervical segment posteriorly was not connected with the brain and anterior portion of the cord, the reflex movements of the fore limbs (and head and neck) by pulling on the skeletal frame, transmitted possibly characteristic mechanical influences upon the isolated remainder of the skeletal musculature and set up proprioceptive reactions that rapidly produced coöperative responses in the isolated muscle groups.

The spinal dogs showed strong aversions for dog's flesh and the point arises that, if the face, ears, etc., assumed a dejected posture, it would be highly important to know what extensive move-

ments the stomach was making, since the dog's flesh "excited disgust" unconquerable by ordinary hunger; and hunger, according to Cannon, is dependent upon definite gastric contractions. Since the spinal dogs also showed sexual excitement and nursed young, it is at least safe to assume that the visceral functions pertaining to reproduction and maternal interests tremendously influenced the dog's behavior, and it is well known that exteroceptive stimuli do not excite a bitch's sexual interests if the reproductive organs are not functioning properly.

That Goltz's (i. p. 207) dog, with its cerebral cortex removed, should have shown anger symptoms when its foot was held, and no other affective symptoms, seems to support the conception that the more highly intricate the integrative functions of the cerebral cortex are, the more refined and delicate becomes the affective response. But this does not support the notion that the affective reactions, as such, originate in the cortex. *The intricate cortex is only a medium of coördinating and reënforcing reactions and enables the organism to react as a UNITY more readily and more delicately to the autonomic responses to pain and pleasure stimuli.*

Sherrington contributed materially to the knowledge that postural skeletal muscle tonus is primarily influenced by the autonomic system, and the dejected posture (postural muscle tonus) of the spinal dog, disgusted by dog's flesh, suggests strongly that in some manner the unpleasant olfactory stimulus had free access to the autonomic system of his dog and produced strong aversive reactions to the odor.

The autonomic genesis of desires, cravings, wishes, emotions, hungers or, in a comprehensive word, affectivity, by causing peripheral proprioceptive changes in the viscera and circulatory system also is supported by the work of Cannon and Carlson.

Cannon's studies of hunger (4, p. 247) indicate the mechanism of the dynamic functions of the personality. That hunger, as a craving, should have a peripheral origin should be given great significance in formulating a conception of an affective sensori-motor system.

Cannon eliminated emptiness of the stomach and excessive hydrochloric acid as causes of hunger by observing that hunger occurred in subjects when no acid was present in the stomach contents or only slightly present and that hunger disappeared after gastric lavage.

Turgescence of the mucous membranes was disposed of, because, when indigestible foods are swallowed, according to Pawlow, no

juices are secreted to relieve the turgescence, and hunger disappears. Cannon well maintains that "*all that we need as a support for the peripheral reference of the sensation is proof that conditions occur there, simultaneously with hunger pangs which might reasonably be regarded as giving rise to those pangs.*"⁵

His method of demonstrating that peripheral changes occurred at the moment of feeling the hunger pangs was that of swallowing a small rubber bulb, then inflating it and connecting it with a recording apparatus. A series of records showed that with each wave of hunger feeling, concomitant and slightly preceding gastric contractions occurred in characteristically intermittent waves. These observations were obtained in others besides himself. He concludes (4, p. 259) "the feeling of hunger, which was reported while the contractions were recurring, disappeared as the waves stopped." "*The close concomitance of the contractions with hunger pangs therefore clearly indicates that they are the real source of those pangs.*"

Carlson's observations (12, p. 64), which were similar to Cannon's, "on more than fifty men are in complete accord with those of Cannon and Washburn." "There is a fairly close correspondence between the strength of the stomach contractions and the degree of hunger sensations experienced simultaneously." (12, p. 69) "The hunger sensation seems to be produced by the contractions only. *When the empty stomach is normal, strong contractions, however caused, produced a sensation of hunger.*" "Hunger contains elements of kinesthetic sensation as well as pain, the latter predominating in strong hunger." (12, p. 65) "Tetanus periods of the stomach are invariably accompanied by a similar fusion or tetanus of the hunger sensation" and (12, p. 66) "abrupt cessation of the gastric tetanus at the end of a strong contraction period is accompanied by an equally abrupt and complete cessation of the hunger sensation." (This supports the conception that the hyperactive viscus determines the nature of the dominating affective craving.)

Carlson (12, p. 219) found that 20 to 50 c.c. of fresh defibrinated blood from starving dogs injected into normal dogs "increases the gastric tonus and hunger contraction of the latter, if their stomachs are empty and if moderate tonus and hunger contractions are in evidence in the recipient at the time of injection of the blood." These reactions did not occur when the stomach was atonic. This indicates that products of metabolism in the blood stream probably have

⁵ Italics mine.

an initiating and an augmenting effect on the autonomic hunger functions.

Cannon's (4, p. 234) description of hunger contains a valuable suggestion for psychology. Hunger is an intermittent, "*dull ache or gnawing pain* referred to the lower mid-chest region and the epigastrium, which may take *imperious control* of human actions" and has an abrupt onset. Besides the dull ache, however, "lassitude and drowsiness may appear, or faintness, or violent headache, or irritability and restlessness such that continuous effort in ordinary affairs becomes increasingly difficult" (4, p. 236). "*The peculiar dull ache of hungriness, referred to the epigastrium, is usually the organism's first strong demand for food*" which if not heeded may "grow into a highly uncomfortable pang or gnawing less definitely localized as it becomes more intense," including the above quoted sensory disturbances (4, p. 235). "The *unpleasantness* of hunger leads to eating, eating starts gastric digestion and abolishes the sensation. Meanwhile the pancreatic and intestinal juices, as well as bile, have been prepared in the duodenum to receive the oncoming chyme. The periodic activity of the alimentary canal in fasting, therefore, is not solely the source of hunger pangs, but it is at the same time an exhibition in the digestive organs of readiness for prompt attack on the food swallowed by the hungry animal" (4, p. 264). This state of "readiness" really is a state of *neediness* for food and the "dull ache" or "gnawing" sensations may well be classed as *itching* sensations which are relieved by the soothing rubbing of foods as well as "indigestible" stuff, mucous, gastric lavage, etc., which according to Pawlow relieve hunger, although no juices are secreted.

The conception then, that the unpleasant itching or feeling in the stomach, which is the "constant characteristic, the central fact" of hunger (4, p. 236) and takes "imperious control of human actions," is the key to the dynamic functions of the personality. At a glance we may see the enormous influence produced upon the behavior of man by the periodical itching in his stomach and his elaborate efforts to acquire adequate stimuli which will neutralize the affective state of hungriness.

It may not be premature here to claim that all the affective functions have the same physiological principle as hunger, and that in principle all the affective cravings are, in their mechanism, forms of hunger no matter how delicately, as sentiment, they may be poised. Their dynamic principle is the compulsion of the organism to acquire such stimuli as will soothe the different forms of *itching*; for example the phrase "itching for a fight" or to do a certain act.

That food hunger should be classified as physiologically and psychologically similar to other affective cravings or emotions is not new. Cannon says (4, p. 232) "on the same plane with pain and the dominant emotions of fear and anger, as agencies which determine the action of organisms, is the sensation of hunger." It is only necessary, in order to firmly establish the James-Lange theory of the peripheral origin of emotions, to apply Cannon's principle of the peripheral origin of hunger and thereby demonstrate that characteristic conditions occur somewhere in the viscera, "simultaneously" with consciousness of an affective or emotional disturbance.

James's theory of the emotions (13, p. 449) is that "*the bodily changes follow directly the perception of the exciting fact, and our feeling of the same changes as they occur is the emotion.*" "*Every one of the bodily changes, whatsoever it be, is FELT, acutely or obscurely, the moment it occurs.*" The fact that bodily changes occur directly following a perception and this change is felt as the emotion is exactly what Cannon established when he demonstrated that certain forms of gastric contractions caused a "gnawing" feeling called hunger. It is interesting that Cannon disagreed with Boldireff's belief, that *hunger provokes the gastric contractions* and reversed the conception to *gastric contractions provoke hunger* (4, p. 253), then he stopped and reversed his dynamic principle by accepting Sherrington's belief that the other emotions originated in the cerebrum, even though he says (4, p. 211), "according to the argument here presented the strong emotions, as fear and anger, are rightly interpreted as the *concomitants* of bodily changes." (Italics mine.)

It is now necessary to demonstrate that environmental conditions (exteroceptive stimuli), which cause, reflexly, obvious reactions or symptoms characteristic of definite emotional states, also cause visceral changes which are essentially as characteristic. This has in a sense never been satisfactorily established. Darwin was inclined to feel that quite opposite emotional states seemed to accompany very similar motor disturbance, to which view Cannon and others tend to agree. I hope to show that the error lay, not so much in the observations, but in the interpretation of the observations—particularly the inciting causes of the emotional disturbances which were observed.

It is first important to demonstrate that visceral changes of a pleasant or unpleasant nature *always* occur when the exteroceptors are exposed to certain potentially beneficial or harmful stimuli. These visceral changes are certainly capable of causing a consistent

stream of sensory reactions or feelings which tend to persist until stimuli are acquired that have the capacity for relieving the autonomic sensorimotor tension or unrest and reestablishing a comparative state of relaxation or rest.

Pawlow (4, p. 4), by careful surgical methods, made a side pouch of a part of the stomach (dog) with a normal nerve and blood supply and wholly separated from the remainder of the stomach. The secretions of the isolated part of the stomach are considered to be representative of the secretory activities of the entire stomach.

By also establishing an esophageal fistula the swallowed food dropped out and was called sham feeding. By this means "Pawlow showed that the chewing and swallowing of food which the dogs *relished* resulted, after a delay of about five minutes, in a flow of natural gastric juice from the side pouch of the stomach—a flow which persisted as long as the dog chewed and swallowed the food, and continued for some time after eating ceased." "And since the flow occurred only when the dog had (1) an appetite and (2) the material presented was agreeable, the conclusion is justified that this was a *true psychic* secretion" (4, p. 5). (*Italics mine.*)

"The mere *sight* or *smell* of a favorite food may start the pouring out of the gastric juice as was noted by Bidder and Schmidt" and confirmed by Schiff and Pawlow (4, p. 6).

That such complex reflex changes are called "true psychic secretions" is confusing and unfortunate for physiology and psychology because the above two sentences contain all the factors necessary to produce physiological responses to adequate stimuli. "When the dog has an appetite" means certainly that the physiological state of the dog is appropriate or *vulnerable* to the stimulus, implying that much of the time the physiological state is different and inappropriate for the reaction. The assertion that when "the material presented is agreeable," or a "favorite food" is seen or smelled, then salivary and gastric secretions are started, is merely stating that the salivary and gastric secretory glands are conditioned to react reflexly to these visual and olfactory stimuli, and the resultant turgescence and activity of the glands cause pleasant feelings (if the food is not withheld). The term "psychic secretion" is *not* justified and is excessive because it clouds up the simple dynamic principle involved. Even in man, where the salivary glands may be stimulated to secrete by recalling the image of a past adequate stimulus, the term "psychic secretion" is unnecessary. It is clearer to adhere strictly to what actually happens and leave out unintelligible "psychic" phrases.

Cannon says (4, p. 8): "Hornburg found that when the little

boy whom he studied chewed *agreeable food* (that is, when the gustatory and perhaps visual and olfactory receptors were exposed to adequate stimuli) a more or less active secretion of gastric juice invariably started, whereas the chewing of an indifferent substance (inadequate stimuli), as gutta-percha, was followed by no secretion." "These observations clearly demonstrate that the normal flow of the first digestive fluids, the saliva and the gastric juice, is *avored by the pleasurable feelings which accompany* the taste and smell of food during mastication, or which are aroused when *choice* morsels are seen or smelled." (Italics and parentheses mine.)

If we adhere to the principle of attributing the "pleasurable feeling" to peripheral autonomic changes because the latter occur simultaneously with, or slightly preceding, awareness of the feelings, the glandular changes should be considered to produce the above pleasant feelings. Adequate stimuli playing upon the exteroceptors of an organism, *when in an appropriate autonomic state*, cause a turgescence of certain secretory glands which, as they secrete, cause feelings which are usually pleasant. (The secretions would cause unpleasant feelings if the individual had parotitis or the food were withheld.) It therefore becomes an excessive appendage to psychology to require an additional source of the emotions.

"*Agreeable foods*" are really materials having the qualities, as sensory stimuli, to cause reactions which are "agreeable" or "pleasurable." Hence they are selected as "choice foods." We usually do not choose the food and then wish the glandular activities to follow. The glandular activities, the vasomotor turgescence and the autonomic activities which result from these stimuli cause the "pleasurable feelings," just as the gastric contractions cause the feelings of hunger. When the feelings of hunger are accompanied by assurances of prompt and adequate gratification they are considered to be most desirable, and we are pleased to feel our "mouths water," but when they are accompanied by fears of not being satisfied, we speak of "pangs of hunger" and dislike to have our mouths water. (See Hornberg's boy.) When the food is attractive to all the others at the table and, because of anxiety about personal responsibilities or love disappointments, etc., we find that our mouths do not water, we complain of very unpleasant feelings which may not only be referred to the dry mouth but also to the griping viscera and inadequate food stimuli.

(When we are not distracted by worries and fears our digestive processes functionate so as to give us a comfortable sense of potency.)

"The conditions favorable to proper digestion are wholly abol-

ished when unpleasant feelings such as vexation and worry and anxiety, or great emotions such as anger and fear, are allowed to prevail" (4, p. 9).

In the following series of observations of visceral reactions unfavorable to digestion it should be noted that in each instance the animal was exposed to stimuli that may have *first* caused *fear* reactions (types of painful stimuli) and then the autonomic system protected itself by compensating with an anger state which would destroy or remove the pain producing stimulus.

Hornberg's boy (4, p. 9) became "vexed" (angry) when he could not eat *at once* and began to cry, then no secretion appeared and Bogen's child (4, p. 10), with closed esophagus and gastric fistula, "sometimes fell into such a *passion*" (anger), "in *consequence of vain hoping for food*, that the giving of the food after the child was calmed, was not followed by any flow of the secretion."

In both observations *delaying the food* seems to have been a form of painful fear stimulus which aroused compensatory anger reactions in order to procure the food by destroying the resistances. It might be held that the digestive functions of the viscera were temporarily changed to anger functions and thus the secretions did not appear. The cries of the child may be regarded as the final reactions to visceral feelings that were made unpleasant by delaying the food.

These observations demonstrate that *pleasant* digestive reactions result from adequate stimuli, but when the latter are compounded with harmful (pain) stimuli (withholding the food) visceral changes occur which impair the digestive functions. The visceral disturbances become unpleasant as they tend to impair the digestive functions; they retard vitally necessary functions of life.

Bickel and Sasaki, as referred to by Cannon (4, p. 11), observed that a dog's stomach secreted 66.7 c.c. of pure gastric juice in twenty minutes after five minutes of feeding. Under very similar conditions, after the dog had been enraged by the presence of a cat (painful visual stimuli) the stomach secreted only 9 c.c. of fluid in twenty minutes after five minutes of feeding. This secretion was rich in mucus. They also observed that when the stomach of this dog was secreting at its usual rate in order to digest the food, and the cat was then brought into the immediate environment, the stomach only secreted a few drops in the next 15 minutes and reactions unfavorable to digestion continued long after the painful distance stimuli were removed.

Oschler, as referred to by Cannon (4, p. 13), reported that

the secretion of the gastric juice, the secretion of the pancreatic juice, and the flow of bile may be definitely checked "in such psychic disturbances," that is, to say it more simply, in the presence of fear or hatred, producing stimuli.

Cannon observed (4, p. 15), by means of the Roëntgen rays, in the dog, cat, and guinea pig, that "very mild emotional (fear, rage) disturbances are *attended* by abolition of peristalsis." "Even indications of slight anxiety (such as covering the cat's nose and mouth until a slight distress of breathing is produced) may be attended by complete absence of the churning waves." "Like the peristaltic waves of the stomach, the peristalsis and the kneading movements (segmentation) in the small intestine, and the reversed peristalsis in the large intestine all cease whenever the observed animal shows signs of emotional excitement"—that is, when the animal is exposed to potentially harmful stimuli (4, p. 16).

Just what is the significance of the *seeming cessation* of the visceral digestive functions? *Is it a spastic postural tonus?* What is the nature of the proprioceptive reactions (kinesthetic sensations) which are aroused by the viscera going into a spastic form of postural tonus? Do these proprioceptive sensations constitute the stream of feeling or "emotional excitement" that one becomes aware of at that time? Is the striped muscle system compelled to act by the peculiar nature of the postural tonus of the viscera, in order that the organism may acquire such stimuli for its exteroceptors as have the capacity to relieve the uncomfortable, probably spastic, condition of the viscera and allow them to resume their more fruitful, pleasure-giving digestive functions? *It is obviously biologically imperative that spastic visceral states should be relieved.* Spastic visceral and skeletal muscles are the source of a continuous sensory proprioceptive stream and, since spastic tensions reduce the capacity to adapt to new needs, they are generally a hindrance.

"The influences unfavorable to digestion, however, are stronger than those which promote it" (4, p. 12) which is what one would expect in the universal struggle for life, and accounts for our elaborate defensive compensatory capacities.

Restatement.—In the preceding collection of observations we have seen that *the autonomic secretory and motor activities react immediately when the organism (man, dog, cat, etc.) is exposed to compounded stimuli which contain a potentially painful stimulus. The autonomic sensorimotor apparatus seems to go into a peculiar form of (spastic) postural tonus and this status is the peripheral origin of a stream of unpleasant "feeling."*

Cannon's belief that the change in the autonomic apparatus rather followed "emotional excitement" in the cerebrum seems to have been largely influenced by the impression that, since different emotional states *seemed* to be accompanied by apparently similar visceral disturbances a difference in physiological function must occur somewhere when different emotions are observed, hence in the cerebrum because of Sherrington's findings in the spinal dog.

It is necessary, because of this belief, to review the cases of anxiety, the one of supposed joy, and the case of supposed disgust referred to by Cannon and two of my cases of vomiting, in order to show that in each case pain stimuli and fear reactions occurred first. (Cannon's interpretation of the psychology of these cases is not satisfactory, because he does not seem to consider that visual, olfactory and auditory stimuli may be as painful as sciatic pain stimuli, and he does not consider the conditioned reflex.)

Cannon reports the case (4, p. 17) of a "refined and sensitive woman" who had "digestive difficulties." She was given a test breakfast and the examination of the stomach contents revealed no free acid, no digestion of the test breakfast, and the presence of a considerable amount of the supper of the previous evening. Her husband had the night previous to the test breakfast become *uncontrollably drunk* (an expression of semi-suppressed hatred or his wife). An uncontrollably drunk husband should naturally cause anxiety and temporary indigestion for any woman if she is normal. We need not assume undue sensitiveness. Here was a definite *vigorous fear stimulus* (of social degradation) and compensatory anger reactions but probably suppressed because the painful experience occurred among strangers (hotel), and the cause of the pain was inaccessible to punishment in his "uncontrollable" drunken state. The second morning, after a "good rest," the gastric functions again became normal; the husband had probably resumed a fairly decent attitude.

Cannon maintains that the digestive functions are also affected by emotions (4, p. 277) "which are usually mild—such as joy and sorrow and disgust—when they *become sufficiently intense*" and "the normal course of digestion may be stopped or quite reversed in a variety of these emotional states." This view seems to be based on a case of vomiting following supposed "intense joy" reported by Darwin, and Miller's case of "intense sorrow," and a case of "intense disgust" reported by Burton.

The case of supposedly intense joy was taken by Darwin (14,

p. 76) from the Medical Mirror of 1865 reported by Dr. J. Crichton Browne. How probably accurate and personal Dr. Browne's observations were, must be kept in mind for the sake of the scientific problem involved. It is given here in full: "How powerfully intense joy excites the brain, and how the brain reacts on the body, is well shown in rare cases of *Psychical Intoxication*"—"A young man of *strongly nervous temperament*, who, on hearing by a telegram that a fortune had been bequeathed him, *first became pale, then exhilarated*, and soon in the highest spirits, but flushed and very restless. He then took a walk with a friend for the sake of tranquilizing himself, but returned *staggering in his gait*, uproariously laughing, *yet irritable in temper*, incessantly talking and singing loudly in the public streets. It is positively ascertained he had not touched any spirituous liquors, though everyone thought that he was intoxicated. Vomiting after a time came on, and the half digested contents of his stomach were examined, but no odor of alcohol could be detected. *He then slept heavily, and on awakening was well, except that he suffered from headache, nausea and prostration of strength.*" (Italics inserted.) This description of human behavior confuses one with a queer use of opposites and makes the case have doubtful value, except that a young man of "strongly nervous temperament," upon learning that he had been bequeathed a fortune, was plunged into a brief intense psychosis. It is noted that he was "irritable" in temper, of "strongly nervous temperament," a polite term for an irritable temperament, and that *he first turned pale* when he was informed of his inheritance. This case cannot be safely accepted as a *pure case of intense joy* because the young man gave strong indications of *first* reacting with acute *fear* (paleness). This could only have been safely determined by a psychoanalysis, because the inefficiency of auto-eroticism, anal-eroticism, inability to handle the fortune, and being reminded of old homicidal wishes suggest themselves as possible reactions in this psychopathic personality. Then followed the compensatory *mixed reaction of joy and anger*. So in this turmoil of *fear, joy, anger* and possibly *love* (successful wooing often depends on money) this psychopath was swept off his feet, and after excessive psychomotor activity with marked incoordinations of incessant talking, singing, irritability and weakness, he vomited, slept heavily, and awakened "well," but suffering from headache, nausea and weakness. This case reminds one of an epileptic seizure initiated by a fear reaction.

Cannon (4, p. 278) gives his impression of this observation as

"a case of a young man who on hearing that a fortune had been left him, became pale, then exhilarated, and after various expressions of joyous feeling vomited the half digested contents of his stomach," and bases on this case his argument that intense joy can cause gastric changes similar to other affective disturbances.

2 The case of sorrow referred to by Cannon (4, p. 278) was a "young woman whose lover had broken the engagement of marriage. She wept in bitter sorrow for several days, and during this time vomited whatever food she took." Whatever this girl sacrificed or lost by the breaking of her engagement is undetermined but obviously *pain* and also *fear* of never again having her love-object caused the behavior reactions of "sorrow" and a definite relation existed in this case of vomiting to pain and fear.

3 The case of disgust and vomiting (4, p. 278) is given as follows: "*A gentle woman of the same city saw a fat hog cut up, when the entrails were opened, and a noisome savour offended her nose, she much misliked and would not longer abide; a physician in presence told her, as that hog, so was she, full of filthy excrements, and aggravated the matter by SOME OTHER loathsome incidents, insomuch this nice gentle woman apprehended it so deeply she fell forthwith a vomiting, was so mightily distempered in mind and body, that with all his art and persuasion, for some months after, he could not restore her to herself again, she could not forget or remove the object out of her sight.*" (Italics and capitals inserted.) This case cannot be safely accepted as a case of intense disgust causing vomiting, because of the probability that the ignorant but overly refined, gentle woman was made extremely apprehensive when she was reminded of her offensive interior by an aggravating physician who delighted in telling refined people that they had filthy interiors, and some other things too indecent to print. The filthy interior readily suggests the filthy soul to people who are obsessed with trying to escape the wickedness of the flesh, and repress their emotions in order to appear refined. It is at least safe to regard the physician's suggestions as *painful* stimuli causing *fear* reactions which were perhaps complicated with cleansing reactions of disgust or aversion aroused by the odors. Besides, judging from the later apologetic attitude of the physician, strong feelings of anger for the offense also complicated this woman's reactions.

Because of the apparent similarity of the crude (shadow) observations through the fluoroscope and the more accurate gastric analysis Cannon concludes that there are "no noteworthy" differences to "visceral accompaniments of fear and rage." (Pain-

ful stimuli and fear reactions, it will be shown, *always precede the* compensatory reactions of rage—see discussion of fear and rage, p. 79, 80.)

Cannon says (4, p. 277): "Obvious vascular differences, as pallor or flushing of the face, are of little significance. With increase of blood pressure from vasoconstriction, pallor might result from action of the constrictors in the face, or flushing might result because the constrictors elsewhere, as, for example, in the abdomen, raised the pressure so high that facial constrictors are overcome . . . or the flushing may occur from local vasodilation." This inference about the variation of facial vasodilation seems to be a mechanical guess and is not a sound point in his contribution.

One can readily understand why those who feel that such vascular differences as pallor or flushing of the face are of little significance, are not likely to be impressed by their own subjective experiences or James's theory of the emotions, because the very foundation of the theory is that the secretory or motor changes, wherever or however they occur, cause characteristic sensory disturbances. (The principle that the nature and location of the peripheral changes determine the nature of our feelings is similar, physiologically, to the conviction universally held that the area of an inflammation or injury is the origin and cause of the sensation of pain.) Intravesicular pressure does not cause a desire or feeling until the pressure is over 18 cm. of water which indicates the delicacy of the peripheral adjustment necessary to produce an affective change. Hence it is readily conceivable that slight variations in postural visceral tensions, which are not observable through the fluoroscope or eye, may cause critical affective disturbances.

Further evidence that the functional tensions of the viscera determine the affective status of the individual is found in the affective influence of cold, fever, exhaustion, and exogenous intoxications. Cannon (4, p. 262) states that "in fever, when bodily material is being most rapidly used, hunger is absent. Its absence is understood, from an observation made by F. T. Murphy and myself, that infection, with systemic involvement, is accompanied by a total cessation of all movements of the alimentary canal. Boldireff observed that when his dogs were fatigued the rhythmic contractions failed to appear. Being 'too tired to eat' is thereby given rational explanation."

This is also true for the more delicate affective reactions. When we are fatigued or have systemic involvements with fever our acquisitive interests and defensive or resistive capacities are decidedly

reduced. We may be "too tired" or "too sick" to enjoy music, art, companions, parties, day-dreams, current events, or withstand a shock, etc. Neither are we then able to readjust the primary affective disturbances of fear, anger, shame and grief. If aroused they tend to continue unduly, indicating an inability of the autonomic apparatus to make compensatory readjustments so readily as in health. I reported a case (15) of nausea and vomiting in a young woman due to repressed hatred and fear following a series of conflicts with her mother-in-law. This psychoneurosis persisted for more than a year and reversed (nauseating) peristalsis was quickly aroused by red fruits and vegetables. Also an instance of vomiting in a physician, who, while fishing soon after breakfast, was excited by hooking a fish, and vomited after it escaped, which was probably the result of inability to protect himself from the fear of losing the fish by catching it (52, p. 450). Everyone is familiar with the feeling of nausea that precedes abdominal retching and vomiting and the nausea and disgust with sensations of gastric movements, indicating a reversion of peristalsis. Children, to express disgust, will hawk, make emissive movements and even make vomiting movements, indicating that visceral disturbances have already occurred which give sensations suggesting the vomiting movements. Many people can testify to a disappearance of all affective interests when seasick, during which time the digestive system is inclined to make persistent, energetic emissive movements. Cannon remarks that loyalty disappears in the face of excessive hunger. So may love, shame, fear, etc., indicating that too vigorous hunger functions of the stomach, when once established, do not permit the less strong affective functions to come into play. Among college athletes I have heard used the phrase "he lost his guts," to mean that the athlete was a weak contender because he suffered from diarrhea (excessive emissive peristalsis)—due to fear of losing and inability to compensate.

When we have acute "sickening pain" we do not feel affectionate at the same time, and when the *sickening* pain is felt it is known that marked visceral disturbances occur. We are all familiar with the severe digestive disturbances, lowered resistance and distressing visceral sensations that are caused by the loss of a love-object and the vigorous appetites and splendid digestive powers that are established when we have firmly acquired the love-object. It requires little imagination to apply the physiological principle of failure to compensate to so-called cases of "shell shock."

Pain- and Pleasure-Giving Stimuli of Distance Receptors

The prominence of the painful stimulus and the primary fear reaction, which precedes the avertive adjustments, must necessarily, from the nature of the problem, be studied as a physiological phenomenon and then its psychological or behavioristic significance reviewed. In order that the similarity may be recognized the physiological disturbances that accompany painful physical injuries, such as crushing a nerve or tearing flesh, should be compared to effects of painful visual or auditory stimuli. It is perhaps necessary to show that visual, auditory and gustatory stimuli may produce autonomic (physiological) effects which are similar to the effects of physical injuries.

A personal experience, while sitting near the side of an open street car absorbed in a problem, confirmed this impression for me. Just as we passed some workmen, who were loading boards on a wagon, they let a heavy board fall flat. It made a sharp, loud bang near my head. My first clear recognition of the presence of the wagon followed the bang. The strong, sharp percussion of my ear drum did not cause pain there, but the instantaneous violence with which my diaphragm (?) "jumped" and (probably) stomach and intestines reacted was painful and, even before I fully realized what had occurred, I felt a rapid defensive compensation of anger sweep over me as a marked vasodilatation in both arms, chest, neck, and face occurred, and then I became aware of a rapidly developing compulsive feeling to speak and act (remove or destroy the cause). Fortunately, before overt movements got under way an affective compulsion to maintain a respectable dignity asserted itself, and instead of wasting the aggressive energy on the unsuspecting workmen it turned on the opponents of the James-Lange theory of the emotions.

While preparing these observations on the peripheral origin of the emotions a trivial experience emphasized the peripheral origin of fear and the compensatory anger reaction which followed. I had filled a metallic, disc-shaped hot-water bottle and was drying it with a towel when suddenly I felt it slipping rapidly through my fingers. The hand was reflexly tightened on the slipping object but also the body and leg muscles had reflexly started to contract in order to pull the frame down toward the floor so as to enable me to get beneath and catch the bottle that had started to fall. This all occurred in an instant and is of course related by retrospection, but the sequence of events were promptly and accurately noted, being a valuable observation because of its entirely spontaneous nature. The hand that

had been holding the bottle in a light postural grip succeeded in resuming its grasp on it and the other bodily movements, particularly that of getting into a crouching position, automatically became excessive and were abruptly stopped when only about one third started. The abrupt stopping of the general flexion of the legs by a general abrupt counter-extension produced a brief but intense tingling of the muscles of the legs and thighs. This was decidedly unpleasant, causing a very disagreeable tingling of the muscles which might be described as *startling*. The abrupt onset of the falling of the object itself caused no disagreeable feelings, but the abrupt stopping of the sudden, tense contractions was very disagreeable, and belonged to the pain-fear type.

Within a few seconds I felt a decided reaction of anger at the bottle and then at my carelessness. This incident, as a spontaneous phenomenon, illustrates the *sequence* of the peripheral origin of the startling, tingling pain and the compensatory anger and is worthy of consideration.

A thirteen weeks' old puppy was cautiously making his first inspection of the snarling head of a bear rug when I made the following observation. He was gradually compensating for his vigorous fear (avertive) reactions which had instantly started when he first saw the head. After many distant, encircling inspections behind chairs, etc., he gradually advanced first behind the head and smelled an extended hind paw, and then cautiously walked up the leg with every receptor wide open for dangerous stimuli. Finally he worked around in front of the bear, pushing his head (the distance receptors, eyes, ears, and nose with the defensive teeth) up first and keeping the remainder of the body extended as far back as possible. When I was sure he could not see me I made a sharp sound with my foot. The sudden auditory percussion precipitated a panicky scramble across the floor away from the bear. A minute or so later a curious interest urged him to return. Some obscure affective craving was urging him. Finally he reached the head, touched noses, licked each eye, smelled in each ear, inspected the open mouth, licked the nose and then mounted the head and began copulation movements. When hunger, fatigue and fear are absent sexual functions come to the foreground in the infra-human primates and man.

It is well known that all young animals, including infants, may be terrified by staring, fierce-looking eyes and deep, guttural sounds. Mothers use soft, purring sounds and brief glances to keep the young comfortable. All animals use harsh sounds and staring to

intimidate enemies. Selous, in his "African Nature Notes," reports that his Kafirs said "their hearts died" when the lions roared near them.

The yelping wolf pack, barking terriers and the profane, irate bully tend to paralyze their victims with auditory percussions before they make their assault with teeth and paws. The cheering of loyal friends in athletic competitions, in theatricals and of soldiers on parade and in battle has an energizing effect.

The purely visual stimulus may cause extremely painful feelings and terror. If one walks through a field or woods in a dusky light with the mind engrossed and suddenly sees a coiled object lying on the ground under one's feet, painful visceral reactions are felt and fright occurs even before one recognizes that the object is or is not a snake. The mere contours of the object start autonomic reflex activities even before the perception of the object is completed. I well remember an experience when walking across a freshly plowed field. As my foot was descending in the stride a partly coiled "something" caught my eye, lying very near the place where the foot was to touch the ground. Instantly the leg supporting the body reflexly projected it onward and the foot, which had descended too far to be retracted, extended out of danger by a movement which started as a step but terminated in a leap. *Painful visceral fear reactions seem to have started before the perception of "snake" was formed.* The conviction of "snake" did not occur until I turned around. The autonomic reflex activities are quicker than perception and probably the existence of many people depends upon this accomplishment of nature, not trusting the responsibilities of life to perception.

Naturally the arm-chair psychologist, who studies out a hypothetical case and visualizes the snake in the grass and then imagines what will happen, will put perception first and visceral activities and emotions second; which is quite true for the fantasy because he has to visualize the snake image first to start the experiment going. When the exogenous stimulus is forced upon the exteroceptor quite a different process occurs.

To return to the hypothetical snake in the grass. If it is small, say a foot long, the compensatory reactions of anger to destroy the painful stimulus quickly follow the unpleasant surprise and perhaps the impulse will be to stamp the head of the snake. Let us magnify the snake, increasing its potency and reducing our proportion of power by being surprised by a snake four feet long. If compensatory anger reactions occurred, an effort to destroy the snake might

be made, provided the individual could realize a comfortable margin of power by seizing a long, strong club. If no weapon was to be had the fear reactions would remove the individual and the aggressive anger compensation would have to get an outlet through fancies of what he would have done had a real club been found. Let us magnify the snake to eighteen feet in length, the painfulness of the visceral reactions and terror may be sufficient to paralyze one, if his physical condition at the time is not rugged, and at best, the painful affective reaction of fear would only produce prompt efforts to remove the receptors from the stimulus. Anger would only follow after a sufficient margin of safety was acquired. As this marginal feeling of safeness and power increased fancies about destroying the snake might be succeeded by efforts to actually accomplish the destruction of the snake or its capture, which would also be destruction of its potential dangerousness.

The compensatory reaction of anger or rage only follows a pain stimulus and primary fear reaction. It is not necessary to expect, for the peripheral theory of the emotions, that immediately a *marked* difference in the metabolic adjustment of the organism, or in the autonomic postural reactions, should be recognizable upon crude observation of the fear and rage, because rage is so quickly and intimately associated with fear that its onset would escape the observer and the difference in the physiological function would be missed. The later autonomic reactions should show at least a marked difference in the postural tonus of the viscera and extensor muscles, and regions of vasodilation, if a protective compensation occurred. Such phenomena could hardly be seen in the shadows of the fluoroscope, but are quite easily differentiated by a frank introspection of one's spontaneous affective reactions.

Some olfactory stimuli, it is well known, cause strong emissive, gagging and retching movements with feelings of nausea and disgust which under certain conditions might be fearful ordeals. Some dogs and horses become panic-stricken when they inhale odors of bears, elephants, lions, etc. Like the moose and deer, they do not have fear reactions upon seeing some animals, including man, but bolt in a panic when they receive the obnoxious odor.

Wertheimer, cited by Cannon (4, p. 18), showed that, in an *anesthetized* animal, the stimulation of a nerve, that would produce pain in a conscious animal, quickly abolished the contractions of the stomach (which is very similar to the fear reaction). This indicates that the higher central functions (perceptive) are not necessary to start characteristic autonomic disturbances for contact,

noxious stimuli. (The notion that the emotion of fear must be felt centrally first and that it then causes the peripheral disturbance is further shaken by such data.) The above experiments indicate that the higher central association tracts are necessary to enable the organism as a whole to become aware of, or react to, the unpleasant (nauseating) feelings caused by the visceral disturbance from the pain stimulus.

This interpretation is further substantiated by Netschaiev, cited by Cannon (4, p. 19). He "showed that excitation of the sensory fibers in the sciatic nerve for two or three minutes resulted in an inhibition of the secretion of gastric juice that lasted for several hours." Nausea, vomiting (reversed gastric peristalsis of varying intensity) is well known to follow painful accidents as well as fearful visual, auditory, and olfactory stimuli.

It may be well to present here further data to show that, although ostensibly the body is not injured by a visual stimulus, it may actually be seriously disturbed, not only in its digestive, secretory and motor functions, but also in its metabolic functions and that the reactions are so similar in their nature that it would not be possible to distinguish, from them alone, whether the causes were painful visual, auditory, olfactory, or physically destructive stimuli.

Cannon (4, p. 44-66) demonstrated that when blood was removed through a properly prepared catheter from the inferior vena cava just above the entrance of the renal veins, in a *quiet*, normal cat, the blood did not cause a relaxation of a test muscle; whereas, when the blood was removed after the cat was frightened or enraged by a barking dog (visual, *auditory*, olfactory (?) stimuli) it caused a relaxation of the test muscle. If the adrenal vessels are tied off and then fear reactions are produced in the cat, the blood does not cause relaxation of the muscle.

Similar relaxations of the test muscle can also be caused by adrenalin solutions of 1:1,000,000 (4, p. 58). Artificial stimulation of the nerves leading to the adrenals causes an increase in their secretions (4, p. 43).

These observations lead to the conclusion (4, p. 62) that the adrenal glands are reflexly activated and pour into the blood-stream an increased amount of adrenin when the organism is exposed to a painful stimulus, whether actually destructive, or visual, auditory or olfactory. The sensory nerves (4, p. 45-46) about the point where the catheter was inserted were made anesthetic with ethyl chloride so that the cat remained tranquil and an increase of adrenin was not found in the blood as a result of the operation. Wertheimer (4, p. 18) in a previously cited experiment on the

anesthetized, unconscious animal, found the gastric functions were inhibited upon the stimulation of a sensory nerve such as would cause pain in a conscious animal. *These observations indicate the importance of the afferent neurone and its almost direct effect upon the autonomic system. The influence of consciousness, or the higher cerebral tracts, is not necessary for autonomic reactions, of the fear-producing type, from contact stimuli.* This mechanism surely has an enormous protective value during sleep and emphasizes the importance of autonomic priority of reaction to stimuli with or without the animal being conscious; hence, with or without the addition of perception.

The effect of the painful or unsatisfactory stimulus and the primary fear reaction has also been shown to cause extremely important metabolic changes. (Unfortunately the physiologists have used the clumsy, complicated term "emotional excitement" in these experiments which, however, doubtless refers to compensatory affective striving following a situation that aroused an *acute fear* of failure to avoid a painful defeat or to retain a love-object.)

In his study of the causes of glycosuria, Cannon concluded that (4, p. 72) "*the promptness with which glycosuria developed was directly related to the emotional state of the animal.* Sugar was found early in animals which early showed signs of being frightened or in a rage, and much later in animals which took the experience more calmly;" and also a glycosuria was found in students after being excited by a football game and after examinations (fear of failure) (4, p. 75-76).

Hence he concluded that just as in the cat, dog, and rabbit, so also in man, "emotional excitement" produces temporary increase of blood sugar.

Macleod, as cited by Cannon (4, p. 198), "found that if the nerve fibers to the liver were destroyed, stimulation of the splanchnic . . . did not increase the blood sugar. *The increased blood sugar due to splanchnic stimulation, therefore, is a nervous effect, dependent, to be sure, on the presence of adrenin in the blood, but the amount of adrenin present is not in itself capable of evoking increase.*" (Italics mine.) Again, as Macleod has shown, a rise in the sugar content of the blood can be induced, if the adrenals are intact, merely by stimulating the nerves going to the liver. *The increased blood sugar of splanchnic origin, therefore, is not due to a disturbance of the use of sugar in the body—but is a result of a breaking down of the stored glycogen in the liver and is of nervous origin.*

This "nervous origin" may be a painful stimulus or "a result

of excitement" (4, p. 200) which, however, to simplify the term "excitement," has its origin in fear of failure, a form of painful reaction.

Relative to the *coagulation time of blood*, Cannon (4, p. 182) concludes: "Such stimulation as in the unanesthetized animal would cause pain, and also such emotions as fear and rage, are capable of greatly shortening the coagulation time of blood. These results are quite in harmony with the evidence previously offered that injected adrenin and secretion from the adrenal glands induced by splanchnic stimulation hasten clotting, for painful stimulation and *emotional excitement* (fear of failure) also evoke activity of the adrenals." (Parenthesis and italics inserted.)

As to the *distribution of the blood supply*, Cannon says: "At times of pain and excitement sympathetic discharges, probably aided by the adrenal secretion simultaneously liberated, will drive the blood out of the vegetative organs of the interior, which serve the routine needs of the body, into the skeletal muscles which have to meet by extra action the urgent demands of struggle or escape" (4, p. 108) from the fear-producing stimulus.

As to *fatigability of muscle*, adrenin (besides influencing the constitution and distribution of the blood) also has the action "of *restoring* to a muscle its original ability to respond to stimulation, after that has been largely lost by continued activity through a long period. What rest will do after an hour or more adrenin will do in five minutes or less" (Cannon, 4, p. 133).

In his experiments on the fatigability of muscle he found also that (4, p. 102) "the increased general blood pressure was effective, quite apart from any possible action of adrenal secretion, in largely restoring to the fatigued structures their normal irritability."

In their studies of *visceral volume changes*, Oliver and Schäfer (4, p. 200) "showed that injected adrenin drove the blood from the abdominal viscera into the *organs called upon in emergencies*—into the central nervous system, the lungs, the heart, and the active skeletal muscles. The absence of effective vasoconstrictor nerves in the brain and the lungs, and dilation of vessels in the heart and skeletal muscles during times of increased activity, make the blood supply to these parts dependent on the height of general arterial pressure. *In pain and great excitement* (fear) . . . this pressure is likely to be much elevated, and consequently the blood-flow through the uncontracted or actually dilated vessels of the body will be all the more abundant." (Italics and parenthesis inserted.)

As to *rate and amplitude of heart beat* Cannon (4, p. 202), bas-

ing his conclusions largely on the work of Hoskins and Lovellette, believes that adrenin, as secreted by the gland, increases it.

"Adrenin injected into the blood stream has as one of its precise actions the *dilating of the bronchioles*" (4, p. 204). The adrenin from the adrenals goes to the right heart first and then to the lungs, so the first effects would be to dilate the bronchioles for the easier intake of air. In strenuous exertion "pain and excitement" (fear) the intake of air is greatly increased by an increase in the volume and rapidity of breathing, which are essential for a plentiful supply of oxygen and the discharge of carbonaceous waste in the time of struggle.

By testing the relaxing effects of inferior vena cava blood, upon intestinal test muscle, taken just above the inlet of the blood from the adrenals before and after asphyxiation, Cannon (4, p. 207) demonstrated that adrenin was secreted during states of asphyxiation, and since (CO_2) asphyxiation is the result of strong exertion, perhaps following pain, fear or anger, he concluded that not too severe asphyxiation, by increasing adrenin secretion, reënforced the animal's powers, after the effects of the emotional reaction had disappeared. (Anger may follow some considerable time after painful fear.)

To summarize the significance of the above series of conclusions by Cannon, Crile and others: Any form of potentially harmful stimulus, whether it stimulates the visual, auditory, olfactory, gustatory, cutaneous, or the entero-, or proprio-receptor fields, tends to cause a more or less vigorous fear or avertive reaction which is promptly followed by a compensatory reaction which either removes the painful stimulus from the receptor (fight) or the receptor from the painful stimulus (flight). In order that this vitally necessary procedure shall be quickly and safely accomplished the autonomic apparatus has developed the capacity to compensate by increasing the amount of sugar and adrenin in the blood, by increasing coagulability of the blood, by regulating the blood supply so that the organs necessary for the immediate struggle shall be given an increase of blood supply and the organs not necessary for the struggle shall have a decreased blood supply, by appropriately changing the blood pressure, by increasing the rate and amplitude of the heart beat, increasing the dilatation of bronchioles and the working powers of the muscle cells.

It is highly important to recognize, in cases of *infection* and *toxemia*, *fatigue*, and in compensation or *disease of a vital organ*, and *surgical operations*, that all forms of pain and anxiety producing stimuli should be prevented from influencing the patient by removing them from the environment, as completely as possible.

(Knowledge of and insight into the affective mechanisms is of the utmost importance to the physician and yet very few medical schools are giving prominence in their curriculum to the psychology of the emotions.)

It now is safe to assume further, since the vital organs must respond in avoiding a pain stimulus, that when their functions are weakened by disease or fatigue, etc., the individual is in a peculiarly vulnerable physiological state, and his capacity to compensate being reduced, an ordinarily minor test of power or resistance may have a disastrous affective influence, whereas, ordinarily the individual may have been capable of heroic endurance. Furthermore, it is also necessary, in order to intelligently consider the problems of the emotions of man, to recognize that the postural tensions of various autonomic divisions (viscera) may become such that the individual's resistance to a pain- or fear-producing stimulus is greatly reduced, and, based upon the law of summation of stimuli, a series of ordinarily minor tests may cause disastrous affective disturbances in the individual. *This mechanism probably determines why many toxic patients become "delirious"* and is intimately related to the "war neuroses" or "shell shock."

To illustrate, a soldier (described by Salmon) who had repeatedly demonstrated heroic courage in the trenches, and received due honorary recognition, fell in love with and married a prostitute while on leave in London. She became lonely when he had to return to duty and, to keep her from returning to her old life, he gave her ample means and sent her to his home on a Canadian farm. Shortly after she arrived she eloped with a laborer. A duly indignant letter from his family was received by the young man and a serious depression of the autonomic functions resulted. While in this state he developed "shell shock" upon being sent into the trenches. In this case we must recognize the development of a vulnerable autonomic or affective state, a summation of pain stimuli and the final reaction of "shock" with distortion of the personality.

The importance and intricate nature of the mechanisms of the emotions makes it highly essential that, wherever students are trained for the purpose of correcting anomalous human functions, as in medicine, surgery, social service, psychology, the law, and the ministry, an adequately organized course of instruction on the mechanisms of the emotions be given.

Crile (16, p. 224) concludes from his observations on the adaptive mechanisms of man and animals that "adaptation to environment is made by means of a system of organs evolved for the purpose of converting potential energy into heat and motion. The

principal organs and tissues of this system are the brain, the adrenals, the thyroid, the muscles, and the liver." Upon the functions of this series of organs Crile formulated his fertile conception of the "kinetic drive" which is wholly a physiological mechanism of the emotions.

Just as in hunger, we have seen that in the autonomic-affective disturbances of the love, fear and anger types the organism reflexly readjusts its relations to the environment so as to acquire from it stimuli which have the capacity to set up such autonomic reactions as will neutralize the unpleasant, disturbed affective or autonomic tensions.

This autonomic law applies also for all other affective disturbances, including all the so-called "delicate" sentiments. The principle of acquiring adequate stimuli and avoiding inadequate or harmful stimuli determines an organism's behavior in its relations to the environment. The principle of acquiring adequate stimuli for itching surfaces is certainly the final compulsive mechanism of the sexual functions of both sexes in all animals and birds. The gratification of the compulsive sexual craving is in its physiological mechanics very similar to the gratification of the itching gastric surface, compulsive food craving. The self-preservative cravings and the reproductive cravings are in no essential respect dissimilar in the principle of seeking counter-stimulation for the neutralizing effect.

The physiologist has been able to demonstrate the autonomic changes of hunger, fear, anger and anxiety, and his experiments indicate that he will probably be able to demonstrate changes occurring in joy, shame and disgust reactions. Clinical and psychoanalytic studies, and, most essentially, *introspective* studies, as in the physiologist's study of hunger, will have to be depended upon for insight into the more delicate affective reactions.

The physiologists, like the anatomists, will have little use for any other term than that of the autonomic system or apparatus, but so soon as introspective data are needed and one's awareness of the particular feelings caused by the autonomic changes is necessary, then the term affective sensorimotor system becomes useful. For the psychologists, and in all forms of applied physiology, psychology and psychiatry, the term affective sensorimotor system is more conducive to clearness.

It has been amply demonstrated by the experiments of Cannon, Crile and others that *the autonomic apparatus preserves itself first*

at all costs of energy, of structure and suffering to the organism. In a behavioristic or psychological sense the autonomic apparatus or affective sensorimotor system always dominates the personality and is the only dynamic principle in the personality capable of sustained action. The simple reflex in itself has only a brief reactive capacity.

At birth, birds, young animals, and infants have anatomically a well organized autonomic apparatus and apparently a functioning affective sensorimotor system as shown in their very early hunger, love and fear reactions (Watson, 17). How much the affective sensorimotor system is elaborated with growth is still a problem, but it seems that the cerebrospinal sensorimotor system is the apparatus which becomes coördinated and systematized most after birth.

The clumsy, helpless struggles of the terrified, or hungry, or playful young indicate that they have a comparatively well organized affective sensorimotor system and a very inefficiently organized cerebrospinal (projicient) sensorimotor system; the latter having, however, an enormous capacity to be efficiently coördinated in its functions. The value of this, making possible greater adaptive adjustments to environmental changes, is obvious.

"Conditioning" of the Autonomic Apparatus

The recognition that the emotions or feelings, or better, the affective-autonomic cravings, have their origin in the peripheral changes in the viscera is of the utmost importance in the study of the nature of man. The problem arises now, how do certain affective cravings come to use certain receptors and avoid others, and seek certain stimuli and avoid others?

It seems, as the following data indicate, that the autonomic apparatus becomes *conditioned*, through experiences, in its avertive and acquisitive tendencies toward the environment. The fear reactions of one cat or chicken may be strongly aroused by the presence of a small boy and others may feel no fear reaction from the same stimulus. Obviously the whole question of the individual's successful struggle for life depends upon what stimuli in the environment cause fear reactions in the autonomic apparatus. In new territories explorers find that a man at first causes little fear reaction in game. It seems that the autonomic apparatus is not only conditioned in its fear reactions, but also in its food-hunger, sexual-hunger, love, play, disgust, and even the selection of migratory trails and habitat, and its mating and creative endeavors.

The work of Pawlow, Bechterew,⁶ Watson and Latchley (23) and an observation by Sherrington, plus a long series of individual studies of the affective functions of normal and abnormal people seem to confirm the more recent impression that the cerebro-spinal sensorimotor apparatus becomes organized, in the development of the personality of man and animals, according to the conditioning of the avertive and acquisitive needs of the autonomic apparatus. (This principle, if true, may necessitate a revision of the general conception of instincts.)

The young of the higher animals and birds have to learn to co-ordinate the functions of their skeletal muscles and particularly of the extremities. They use the same skeletal muscles and very similar coördinations for defence as well as for offense, for the avoiding or acquisition of stimuli. In the different uses there seems to be no fundamental variation. *The variant lies in the affective (autonomic) disposition at the moment.*

This is probably also true for the nest-building of birds and for raising the young.⁷ Certainly marked changes occur in the autonomic apparatus during the breeding season and observations of the fear and anger reactions of birds and animals during the breeding state indicate that marked changes occur in their affective dispositions.

Bechterew first pointed out, and has since been supported in America by the work of Watson and Latchley, that when the primary stimulus of a secretion or motor reflex is associated simultaneously for a number of times with an uninfluential or indifferent stimulus then the reflex will become conditioned to react to the previously uninfluential stimulus.⁸ It has been observed that individuals vary greatly in their susceptibilities for having reflexes con-

⁶ I have had to depend upon an unauthorized translation of Von Bechterew's "La Psychologie Objective," Chapter IX, which, however, is so clearly intelligible that many of the general principles of conditioning reactions are freely used in the following discussion.

⁷ The so-called inherent nest-building instincts of birds and animals are not satisfactory as contradictory or substantiating evidence because of the little that we know about the conditioning influence of the birdling's sojourn in the nest, the frequency with which the bird handles material in the non-nest-building season, and whether or not it uses any specifically different movements in the nesting season.

⁸ If a painful electric stimulus is applied to the great toe, which causes it to be reflexly withdrawn, and is simultaneously associated for a number of times with a bell sound (uninfluential stimulus) which previously did not affect the toe reflex, the toe reflex will become conditioned to react to the bell sound after the painful electric stimulus has been stopped. Watson (23).

ditioned, which observation is strongly supported by studies in psychopathology (15).

Bechterew's studies have demonstrated further that when a secretion or motor reflex has been well conditioned to react to a formerly uninfluential or indifferent stimulus, this non-influential or conditioning stimulus may in turn, under forcible conditions, become the means by which other indifferent stimuli may develop a conditioning influence. Here again individuals (men and animals) vary greatly; no doubt the affective-autonomic apparatus varies greatly in its reactivity, existing in a more or less vulnerable physiological state, as is indicated from the study of psychoneuroses. The variation in reactivity lies not only in the association capacities of the individual but also in the nature of the affective cravings at the time of the stimulation or experience.

This peculiar capacity of the different segments of the autonomic apparatus to react directly to primary stimuli, and also to become conditioned through experience to react to the associated stimuli, knits the entire organism into a reactive unity because of the complicated, repetitious intermixing of stimuli in the environment. Hence it becomes more complexly integrated and delicately balanced in its avertive and acquisitive reactions as the effects of later conditioning experiences become superimposed upon the previous experiences of preadolescence.

A hungry monkey or child that will boldly take a prune from the hand, but run from a stick in the hand, may cautiously approach to seize a prune from the end of a stick, but under no circumstances return near the stick-prune after it has been struck by the stick. Also the stick itself will not cause *fear reactions, nor the empty hand, but the stick in the hand may cause a panic*. The sight, odor, and sounds made by a hunter did not frighten a young moose until he threw a club at it. After that the olfactory, visual and auditory stimuli from the man alone caused fear reactions and flight.

The association of primary with indifferent stimuli seems to be the principle by which the distance receptors develop most of their capacity to cause reactions of motor and secretion reflexes. Some time in the individual's past the stimulus of the distance receptor, which heretofore had an indifferent effect upon the reflexes of the organism, was, by coincidence, associated with a contact stimulus that had an inherent primary capacity to arouse pain or pleasure reactions in the organism.

A two-year-old boy was learning to play with fireflies through the influence of an adult. For him all insects of the firefly size were

like fireflies. One day he caught a bee. It stung him in the finger and since then he will not go near a bee and touches fireflies very gingerly. If the bee experience had been the first experience with insects all insects would have been potential bees for some time (causes of pain), and fireflies would probably not have been handled until numerous pleasure experiences with other very different insects had been acquired.

A little girl (about six) was in a carriage crossing a track, when the horse, driven by an older girl, became frightened at the approach of a train. A horrible catastrophe was barely averted and since then this girl (now fifteen) still feels uncomfortable reactions when she recalls the experience, when she passes this railroad crossing, and is very uncomfortable in carriages without a well-trusted man driver.

Another little girl (about seven) found her grandfather hanging by the neck from a tree. He committed suicide largely because his son, the girl's father, mistreated him and wished him to be out of the way. The man's face made a particularly horrible visual impression because of the protruding black tongue and the dark, swollen face. At thirty-five, this girl is almost constantly in more or less of an anxiety state because she cannot get rid of the visual image of her dead grandfather, which becomes particularly vivid at night. He was her chief comforter during childhood and she still retains an affective craving for him which she cannot repress ("forget"). She has made several attempts to commit suicide by blowing herself up with dynamite and destroying herself with fire, so that she will not leave a horrible scene of herself like the grandfather. She speaks of him as calling her to come to him.⁹ In her, the conditioned love cravings persist in seeking their most pleasing stimulus, the living grandfather; hence, the broken idol which must be reconstructed.

Bechterew and his assistants showed that the conditioning of the reflex comes into existence through *the simultaneous association of an indifferent stimulus with a primary stimulus of the motor or secretion reflex*. The following series of observations of this function were selected because they seemed the most pertinent for psychopathology.

1. The associated reflex thus established shows a tendency to gradual extinction which is unlike the influence of the primary reflex, as the dodging of the troops to shell fire disappears in due time.

⁹ For further illustrations of the conditioning influence of the ordinarily indifferent stimulus, see (15).

2. The conditioned reflex, at first, is in type, more or less, a general reflex, but gradually becomes a closely determined (specialized) reflex. In some people all guns and pistols cause fear reactions, but gradually only the loaded gun causes fear reactions. People are conditioned through opinions to be afraid of all mushrooms, but gradually will eat anything called mushrooms without fear, if served by certain people, or if the mushrooms have certain characteristics.

3. If the conditioned reflex becomes reënforced by every new stimulus which occurs simultaneously with the primary stimulus of the reflex, the reflex then tends to become generalized in its reactive capacities. When a buyer feels that he has been cheated by a clothier having certain racial characteristics, he does not feel wary of all salesmen, unless it is his first buying experience, but, if he is defrauded a series of times by salesmen of this same race, all salesmen of this race will cause him to have fear reactions. As men grow older in experience their distrust of men increases, becomes more generalized, and their feelings of confidence in men is only won by accurately defined assurances.

4. Artificial respiratory reflexes can be formed to react to a light stimulus when the light stimulus is associated several times with a violent sound, such as the firing of a gun. The respiratory reflex may be aroused by sounds, if for a time they are associated with pain stimuli.

Children, their crying and general fear reactions, may become conditioned, not only to react with fear at the sight of an instrument that caused pain, but at the sight of the surgeon that performed the operation even when seen under entirely different circumstances, such as on the street, or upon seeing some one who looks like the surgeon.

5. Motor reflexes such as extension of extremities may become conditioned to react to ordinarily indifferent light and sound stimuli through simultaneous associations with pain stimuli.

6. The formation of the conditioned reflex seems to begin with the onset of the indifferent stimulus. For example: If a faradic stimulus is started several seconds after a light stimulus has been started the reaction will begin with the onset of the light stimulus after the association has been established and not several seconds later (the time of *onset* of the primary stimulus). This reaction may again become specialized. When a child is bitten in his first experience with a barking dog he has fear reactions as soon as he sees or hears any dog. Later, after experiences with gentle dogs

he only has fear reactions when dogs show their teeth, or growl or bark. Still later the bark may only be regarded as a bluff and the growl may become differentiated in its qualities of pitch and timbre as a playful growl or a dangerous growl.

If a reflex to a given color (Walker, cited by Bechterew) is established, it occurs at first to every other color, but gradually, as other colors than the given one (say red) are allowed to play as indifferent stimuli, the reflex becomes conditioned to react only to the red stimulus. (See the vomiting and nausea reactions of Mrs. V. G., 15.)

7. In dogs (Protopopoff, cited by Bechterew) the (motor) reflex may become conditioned in its reactions to differentiate the qualities of a 1/7 tone.

8. A reflex may become so specifically conditioned to react to certain forms of stimulation of certain skin areas that stimulation outside these boundaries will not arouse it. (Israelsohn, cited by Bechterew.)

9. A reflex once established gradually grows weaker in its response to the associated stimulus and finally disappears entirely (atrophy of disuse). It can be revived by a renewed association with the primary stimulus and with frequent repetition grows more and more permanent, as in teasing.

10. Aside from repeated association of the primary and indifferent stimuli, the similar qualities of the stimuli and the conditions of the association are of importance; in dogs a reflex to a tactual stimulus is established very quickly when associated with an electrical stimulus and it can be obtained more than 30-40 times in succession without reassociating it with electrical stimulation (Israelsohn, cited by Bechterew); while the reflex to color stimuli requires a much greater number of associations for fixation, does not differentiate so quickly and weakens sooner (Walker, cited by Bechterew). (See the determinants for the selection of images, p. 64.)

11. Fairly strong stimuli that have the capacity of arousing affective reactions may be inhibited, for a time by other stronger stimuli (distractions) but gradually the inhibiting influence is lost. Peasants in France who fled with the first sounds of cannon returned to their homes and were no longer disturbed by the firing. This seems to be true also for birds and small animals along the firing line.

12. When a motor reflex has been conditioned to react to an associated stimulus, under certain conditions other stimuli may be

associated with this conditioning stimulus and a secondary conditioning of the reflex may be established. For example a foot retraction may be conditioned to react to a sound stimulus and then by association with the sound stimulus it may become secondarily conditioned to react to a light stimulus.

13. A motor reflex conditioned to react to a combined light and sound stimulus will react upon the incidence of either one. If the reflex is fatigued to sound by repeated stimulation then the reflex to light is also fatigued at the same time (but perhaps not to the same degree), or vice versa. Although the reflex is fatigued for either single stimulus, it will still react for a brief number of times to a combination (summation) of the two stimuli. The reflex may, however, become so specialized in its reaction that only a combination of the two stimuli will produce the reaction.

"Individuality" (that is affectivity) plays a great rôle in the formation of the reflex as well as in its durability.

14. The reënförment of a waning association stimulus of the distance receptors always depends upon its reassociation with the primary pleasure or pain stimulus.

15. Investigations have shown that the lowest threshold of the association reflex corresponds to the threshold obtained by introspection. (This seems to mean that the faintest or most obscure traits in an object that are still necessary to remind us of another object are the stimuli that have the lowest threshold in order to arouse the association reflex.) For example, the physical attributes and posture of a patient's hand may suggest a comparison with Mona Lisa's hand to one observer and not suggest it to other observers until they are reminded of it. It is almost certain that this novel association of hands was conditioned by the observer having had a recent or unusual interest in the Mona Lisa hand.

16. Association reflexes are just as mechanical as simple reflexes and cannot be inhibited voluntarily. Spoken words and written words as motor reflexes (see also dreams, 19) are well known to become so conditioned and determined that they will be reflexly aroused by the association of stimulus words. (The reaction time measures the intensity of the voluntary struggle to repress the unpleasant reaction word in order to respond with a substitute.)

17. When one blushes upon hearing an unpleasant remark about himself the reaction may be interpreted as a vasomotor reaction of a certain area being conditioned to respond to the stimulus-remark. The foundations for the conditioning associations must necessarily

be sought for in the primary stimulus (an experience which aroused shame reactions although one may not be aware of the association at the moment of blushing).

18. It is well known that under certain physiological conditions (a) salivary secretions may be aroused by certain words, having a definite connotation; (b) hunger contractions may be started by sight of food, sound of a bell, the hand of the clock, etc.; (c) evacuation of urine or feces or inhibition of their evacuation may be caused by anxiety producing stimuli; (d) sexual sensorimotor and sensori-secretory reactions are highly conditioned to respond to closely circumscribed sound, light, color and form stimuli, olfactory stimuli and less specifically defined touch and kinesthetic stimuli aroused through movement. They are always inhibited by fear-producing stimuli.

19. If, as Bechterew has shown, the autonomic apparatus can be conditioned to react to (a) definite forms of stimulation of almost specifically circumscribed skin areas, to (b) sounds having almost exact timbre and pitch, to (c) definite colors, forms and intensity of light stimuli, to (d) certain gustatory stimuli and the highly important olfactory stimuli, then Freud's conception, that the development of secondary and primary erogenous zones is always different for, and characteristic of, each individual (determined by his experiences) is given a firm physiological foundation (20).

Just as the autonomic functions became *conditioned* to use certain receptors and avoid using other receptors, and seek certain stimuli, and avoid other stimuli, so may the affective cravings be shown to act. The principal value in this rather repetitious discussion of the conditioning of our cravings or wishes is in that it strongly supports the inference that sensations caused by the autonomic changes and the affective cravings or wishes are one and the same thing, but unfortunately have not been generally so regarded.

Conditioning of the Affective Cravings

We not infrequently hear of people "falling in love" at first sight, or upon hearing a voice, or of spontaneous enduring friendships, or spontaneous aversions on sight, etc. A male patient was heterosexually impotent unless he visualized the face of a certain man. When a boy of fifteen this man seduced him several times. Another man was in an anxiety state for fear of social ruin because of his tendency to become infatuated with men of a certain type. When girls admire their fathers they are very prone to feel strong attractions for men having some of their father's attributes and may

be unable to feel love reactions for other types of men. This tendency varies considerably in degree with different girls and, as their affections become more definitely conditioned so as to react to the father's attributes only, they become more unable to love all other types of men. This conditioning of the love reactions of the son to the father's or mother's, the brother's or sister's, or aunt's attributes is also true. Phobias and obsessive cravings have essentially a conditioned reflex foundation. Heterosexual potency in adult males and females is entirely dependent (considering the individual to be organically normal) upon the nature of the conditioning of the sexual reflexes (love affections). If the type of the sexual object that alone has the property of invigorating the male's or female's sexual functions is so highly specialized by a parental attachment that no adequate image or substitute can be found, the individual tends to suffer from the horrors of incest. Passive homosexuality is usually the result of so conditioning the affective reactions that the individual is incapable (castrated) of heterosexual powers, fear apparently causing an affective regression to a more dependent affective attitude (5).

The grave problem of sexual perversions is essentially one of conditioned reflexes in many people just as a happy virility is the manifestation of the conditioned reflex.

Selection of mates is essentially dependent upon the conditioning of the affective reactions to respond to definite forms of stimulation of the exteroceptors. This generally determines mating to occur only within species, since its specific nature generally precludes mating between species and constitutes a mechanism in *sexual selection*.

Biological potency depends upon the conditioning of the affective sensori motor system to so react to stimuli as to give feelings of power and joy and not of fear by causing an appropriate shift in the blood supply and by stimulating the glands of internal secretion.

Savages, as well as civilized people, use rituals, images, fetiches, amulets, souvenirs, eat and drink animal and vegetable extracts in order to stimulate in themselves feelings of happiness, grace and power. The images and rituals that are retained, and are liked, have an energizing, "inspiring" value because the autonomic apparatus is conditioned to react to certain stimuli which are to be found, in part, perhaps in miniature, in the image or ritual. The image or fetiche used by the intelligent individual or savage has an actual and very valuable physiological influence in counteracting the tendency to anxiety about his fitness and potency. One observes

that demented patients resort to this same method of reinvigorating themselves, using mannerisms, fetiches, "cures," etc. Some religions have highly developed the subtle use of images and fetiches to give the anxious individual feelings of grace, potency and well-being, but the individual refuses to recognize that the ritual exists merely for that purpose because that would tend to defeat its value.

The following observation may be considered as an instance of the conditioned affective reactions in an individual to visual stimuli. A young man, while walking through a crowd in a depot suddenly felt and showed considerable elation and excitement as his eye caught the figure of a girl. "It is R—," he said, and started toward the girl. As he drew near, his eye caught a movement of the girl's head that made him say, "It may not be R—, but it certainly looks like her." Another step, and his eye caught features that made him say, "It is not R—, but her figure and carriage certainly look like R—'s" and his elation changed to chagrin. The personal and physical attributes of R— had certainly previously given him very pleasing affective reactions and the physical attributes of the stranger, which were similar, also caused pleasing affective reactions, until they became too adulterated by other visual stimuli of indifferent or offensive value.

One can easily collect numerous illustrations of fear, anger, anxiety, hunger, shame, sorrow, joy, and other affective reactions, to peculiar stimuli, which would have had an indifferent value, except for their associations with other stimuli which have previously had an unusual affective influence.

We tend to like strangers because they have physical and personal attributes and mannerisms like those of certain friends. We tend to dislike new acquaintances because in some respects they are like people who have been offensive to us.

That the autonomic nervous system may be conditioned to react to stimuli is observable in the milk sheep. When her lamb is shown to her milk begins to drop from her udders and this may occur when she hears it bleat (Mikitin). After a piece of meat is taken from a box for a series of times, opening of the box will start the digestive functions in the dog.

A personal experience may be cited here. While eating a shredded biscuit in a restaurant the spoon uncovered a cooked fly in such a manner as to cause conviction that it had been in the biscuit. With the greatest difficulty the nausea and disgust was controlled, but since then it has been impossible to eat this type of shredded biscuit without feeling strong aversive movements in the

stomach. As this was first written the recall of the images of that experience aroused feelings of nausea.

Blushing, obsessive phobias, compulsive cravings, psychoneuroses, appetites, sexual excitement, hatred, convulsions, vomiting, anesthetics (15), etc., are autonomic reactions that become conditioned to react to well-defined stimuli which may have a wholly indiffernt effect upon other people.

Sherrington (11, p. 395) observed in his Turin dog that the signal noise of the inductorium which was heard by the animal caused cardiac inhibition (from 180 to 54 per minute) with increase of the systolic amplitude and also affected the rate of respiration. He explained that this was possibly due to association of the sounds of the inductorium to previous painful (faradic) stimulation of the skin when mapping out areas of anesthesia upon several previous occasions. Besides the cardiac and respiratory disturbance he noted that the recurrence of the sound occasioned "emotional anxiety." No rise of blood pressure occurred, the dog having a spinal transection just posterior to the origin of the phrenic nerve.

One may see in this laboratory experiment a situation analogous to the stage experiments of theatrical managers. The audience, which congregates to give itself up to being emotionally manipulated by the players, is artfully conditioned by the actor's words and manner to be ready for a scene or incident that is to follow. A further (conditioned) complication may arise when the players get the audience "set" and then fail to put the hit over the footlights due to the mispronunciation of a well-known word, the situation falling "flat."

Savages as well as intelligent people in modern civilization are greatly affected by the personal property of the dead, departed, hated and loved. Mementoes and gifts cause affective reactions by association of the gift (indifferent stimulus) with the donor (primary stimulus) on the principle of the "conditioned" reflex.

Lovers delight in giving themselves to each other in the form of gifts, photographs, wearing apparel, etc. Parents often cherish the wearing apparel and toys of their children for their affective stimulation ("old ties"). On the other hand people tend to avoid objects to which they have become conditioned to react with unpleasant feelings of hatred, disgust, sorrow, shame, fear, etc.

Restatement.—We have seen that various divisions of the autonomic system, which includes the innervated cells, such as the salivary glands, tear glands, circulatory system, stomach, sexual organs, etc., eventually become conditioned to react with avertive

or acquisitive tendencies to definite forms of stimulation of any of the great receptor fields, and this is also true of all the typical forms of emotional or affective reactions one may experience, as well as the more atypical and usually more delicate affective reactions or sentiments. Furthermore, different autonomic reactions may become conditioned to react to the same general situation, as fear and love being aroused in an individual without his being able to recognize the different stimuli causing the reactions, and since this unconscious mechanism would be even more likely to occur in the savage, child, and lower animals, birds, fish and insects, it explains the mechanism of unconscious or natural selection; that is, sexual selection, which Darwin emphasized in his theory of evolution, as a determining factor of the universal struggle for life because of the fierce competition that must naturally result when two individuals are conditioned to require the same object.

PART III

THE NATURE OF THE DYNAMIC INFLUENCE OF THE AFFECTIVE FUNCTIONS UPON BEHAVIOR

The Continuity and Complexity of the Affective Stream

There has been a strange tendency among many psychologists to consider that an emotional state exists only when the individual shows some perturbation of his habitual composure. It is fundamentally essential to recognize that during consciousness an emotional or affective status continuously exists, and during sleep the stream of affectivity is subliminal in its activity, except during dreams. We are always, when conscious, aware of a state of feeling, of an emotional status, even during states of rest, reverie and general indifference. The affective status constitutes our attitude-of-mind and largely determines the nature of the content of consciousness.

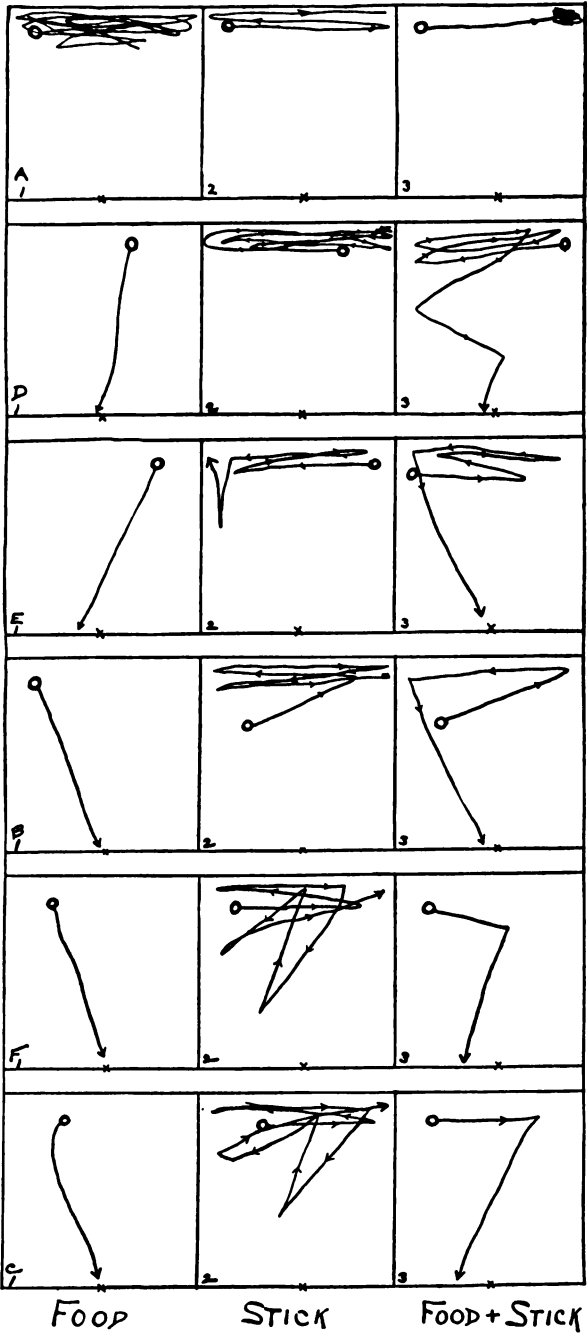
Another naïve assumption of some psychologists, that has been the cause of considerable confusion, is the tendency to consider that an emotion either exists or does not exist, and that it exists in the personality by itself as a free agent that may attach or detach itself to objects, people, ideas, etc. The facts that a reflex may be aroused by the summation of subliminal stimuli and that gastric contractions precede hunger, certainly show that autonomic activities occur before cravings or sensations are felt and may endure without our being conscious of them. There is no evidence that we are ever possessed by one pure emotion, such as love, anger, fear, sorrow, shame, disgust, etc. We may feel that an affective status such as love, anger, fear, etc., completely dominates us, but if one will take the trouble to analyze himself while he is dominated by a strong affective disturbance he can usually recognize the symptoms of other affective tendencies at work in the background of consciousness. Frequently they are quite opposite in nature, and one's behavior is the resultant or compromise of the various affective tendencies inhibiting or reënforcing one another. One may often see this neatly illustrated in struggles with compulsive cravings and in moments of indecision that occur frequently during the day, as opposing affective interests demand gratification at the same time by

one act or decision. We may have two or more affective processes strongly at work within ourselves at the same time, aroused by the same complex situation, because various attributes of an object or a situation may each vigorously stimulate quite different varieties of autonomic activity, causing a quite indescribable but very strong affective state.

A simple experiment demonstrates this type of affective conflict. (See Fig. 3.) A prune held before a series of monkey cages brought the monkeys in almost a straight line to the screen. A stick then held before the cages caused them to make tangled trails in the back of the cages. Then a prune on the end of the stick brought them to the prune in a zigzagged line. In such experiences one sees that the prune-hunger straight line and the stick-fear tangled line of adaptation is formed into a resultant prune-hunger—stick-fear zigzagged line. One is inclined to see in this zigzagged line the effects of mild avertive fear and acquisitive hunger contractions in the stomach compromising each other. Affective conflicts, at times, may become extremely severe and complicated. We may feel a confusion of admiration, love, hatred, and disgust for the same person at the same time. We may admire a man's delivery of a speech, love some of the principles he propounds, hate him for an irreparable, personal wrong, and be disgusted by his personal appearance, and then say to our friends that Senator X is an eccentric old man.

A young woman's personality was almost annihilated by a prolonged turmoil of emotions. She admired her husband's ability but suffered *anxiety* from his extravagant waste of money. She *loved* her baby but felt herself unfit to be its mother because of her *shame* from masturbation. She was in a perpetual state of *fear* lest she would be without means and her wrongs discovered. She was *angered* because of the frank aversions of her relatives for her husband and suffered from feelings of inferiority (*fear*) of long standing, and mingled with all this was a distressing compulsive *eroticism*. Finally, bewildered, she attempted to commit suicide, then passed into a long-enduring grave dissociation of the personality. Like the diagnostician, the psychologist must learn to study exhaustively all possible complicating derangements after the primary disturbance has been found. In this young woman the primary difficulty was due to an uncontrollable autoeroticism.

Repressed affections, as numbers of psychoanalyzed cases have shown, may greatly influence an individual's behavior without the individual being aware of the nature of his affectivity except that he feels strong avertive or acquisitive tendencies toward an object.



Very few people realize, when they are expecting to speak before an audience and are distressed by violent cardiac, vasomotor (blushing or pallor) and visceral disturbances, that beneath the eagerness to say something impressive is the fear that the audience will be indifferent, or bored, or inclined to ridicule instead of respect the statements.

Individuals may suffer, without being aware of any affective derangement other than a distressing feeling of internal tension, from repressed hatred, fear, shame, sorrow, love or disgust, while striving to maintain an attitude of apparent composure.

The Influence of the Affective Stream upon Behavior

All affective processes are always characterized by acquisitive tendencies toward certain stimuli and aversive tendencies toward other stimuli. Hence an affective craving has an ambivalent relationship toward the environment and exerts an ambitendency upon the organism in its aversive and acquisitive striving. Any typical affective craving, by its nature, divides all stimuli into satisfactory or unsatisfactory stimuli, into beneficial or harmful stimuli for itself. When conflicting affective reactions are aroused by an object or a situation, such as fear and admiration, or fear and anger, different attributes of the same object or situation arouse the different affective reactions. The fangs of a small rattlesnake may arouse strong fear reactions and aversive tendencies, but its smallness arouses in us a safe marginal feeling of power and compensatory anger reactions with strong acquisitive compulsions for its destruc-

FIG. 3. This diagram shows how one's behavior is like the resultant of parallelograms of opposing forces—autonomic cravings. *A* to *F* are six monkeys separately tested while isolated in a cage. In series I, a bit of food was held in the hand by a careful observer, at (*X*). The arrow marks the comparatively direct acquisitive course of reaction. In series II, a stick was held at (*X*) and the arrow marks the excessive aversive course of reaction which became tangled and incoordinated because of the firm resistance of the environment. In series III, a bit of food on the end of a stick was held at (*X*). The arrow shows a zigzagged resultant of aversive and acquisitive reactions, with final seizure of food. (The aversive, fear, reactions in *A* were so marked for the stick that they could not be traced.) The degree of the acquisitive or aversive reactions to the situation must, of course, vary with the vigor of the autonomic craving or tension.

The same diagram may well be used to show the reactions of a child or adult doing pleasing work under a parent, teacher or boss who is liked, series I; or doing work that is disliked under conditions that cause anxiety, series II; or doing work that is liked under conditions that cause anxiety, series III.

tion which dominate the avertive fear reactions. The cautious assault reveals the compromise. The crushed, dead rattlesnake as a stimulus then appeases (neutralizes) the anger reactions. We feel "satisfied" and tend to brag of our exploit (potency). An object or situation must always be regarded as a composite of stimuli, some of which may cause quite the opposite reactions at the same time, although the object only stimulates *one* receptor field, like the prune-stick (visual) stimulus. An individual may fill us with admiration and then shock us with a revelation of weakness. An actress may win our admiration by her grace and ingenuity while we are disgusted by her moral reputation. One may imagine a painting that may be a source of inspiration to many so soon as the pose of the head of one figure is changed appropriately.

A sound, an odor, a glimpse, a movement may instantly destroy the magnificent effect of a stage scene. A misplaced word may be disastrous.

In the study of the behavior of animals, and even in the simple reflex, a variation in threshold of response may often be observed. The status of the affective cravings (or "autonomic component") of the animal determines its reactions to the maze, the puzzle, problem, struggle, etc. Hunger, fear, and love, sometimes disgust, and anger are usually depended upon to furnish the dynamic principle in the experimental situation. When the behaviorist must depend entirely upon the physical attributes of the maze and not the affective urge, his efforts yield little result.

When a rat solves a maze to acquire freedom or food it quickly learns to eliminate the blind passages for which the dominant affective craving has an aversion, and when it finally reaches the food, say after the shortest possible number of movements, the gastric affective craving continues its compelling influence until its itching is neutralized by the food stimuli being placed in the stomach.

In the formation of a habit we may observe in the trial-and-error method that the affective state compels the use of a wide variety of movements with more or less repetition and unique combinations with the gradual elimination of the movements that exposed the receptors to unsatisfactory stimuli, such as going to the end of the blind alley, or a pain stimulus. (If the animal greatly needed to solve the maze for the sake of its life the blind alley would virtually become an additional pain stimulus.) When imitation is possible the elimination process is often greatly abbreviated. If the principal receptors, which the affective craving used most in the situation, are eliminated, then the motor coördinations will be

reorganized so that the newly adopted receptors will not be exposed to stimuli for which the dominant affective craving has aversions. This is shown in the gradual elimination of useless movements in relearning a maze after the eyes, or vibrissæ, etc., have been removed in the rat (10, p. 210).

Emotions and Instincts

No subjects in psychology have aroused more controversy than emotions and instincts. A review of some of the most prevalent conceptions of emotions and instincts to be found in academic psychology shows a vague but persistent tendency to divide bodily reactions into instinctive or emotional types as they tend to deal with the environment or to terminate within the body. In this respect academic psychology tends to agree. The disagreement lies in the conception of the central or peripheral origin of the emotions.

James (13, p. 442) confusingly says: "Instinctive reactions and emotional expressions shade imperceptibly into each other. Every object that excites an instinct excites an emotion as well." "When outward deeds are inhibited, . . . emotional expressions still remain." "Emotions, however, fall short of instincts in that the emotional reaction usually terminates in the subject's own body, whilst the instinctive reaction *is apt to go farther* and enter into practical relations with the existing object." (*Italics inserted.*)

This vague and unsatisfactory differentiation of emotions from instincts confuses his law of the emotions. It considers, however, that autonomic changes, of which we become aware as feelings or affective disturbances, are the emotional reactions. That the "emotional reaction *usually* terminates in the subject's own body whilst the instinctive reaction *is apt to go farther* and enter into practical relations with the exciting object" is hopelessly vague and confusing. The terms "usually" and "apt to go farther" permit such unlimited vacillation that they are useless for physiological psychology.

Ladd and Woodworth (22, p. 523) state that "besides the physiological changes of central origin which accompany or follow certain perceptions and trains of ideas, the wonderful *characteristic* effect which these forms of feeling produce upon certain of the *vital organs* is the most noteworthy peculiarity of the affection, emotions and passions." They emphasize the vasomotor reactions as being among the most important. This is a reversion to the old

notion about the central origin of feelings but recognizes that the autonomic apparatus plays a part in the affective process.

Pillsbury (24) says a single response is a reflex, a complicated series of responses an instinct. All emotions have an instinctive basis—every emotion has its instinctive side; and every instinct has its emotional side; emotion is concerned primarily with responses that end *altogether* within the body; impulses are the instincts that lead to action directed beyond the body.

Pillsbury is more definite than most introspective psychologists in his definition that emotions end "*altogether*" in the body and that instincts lead to action directed "*beyond*" the body. He certainly applies emotions to functions of the autonomic sensori-motor system and reserves instincts for the expressions of the projicient sensori-motor system. That every emotion has its instinctive side and every instinct has its emotional side is a confusing statement, unless it means that every affective sensori-motor change (emotion) exerts an influence upon the activities of the projicient motor system (instincts).

Angell (21, p. 369) quotes James in his discussion of emotions as follows: "An emotion is a *tendency to feel* and an instinct is a *tendency to act* characteristically when in the presence of a certain object in the environment." Here again we meet with a distinct connotation for emotions, as an internal bodily function, a tendency *to feel* characteristically, as an autonomic-affective sensori-motor phenomenon. It differentiates emotion from instincts. The latter, he says, are a tendency *to act* characteristically, which is a phenomenon of the projicient sensori-motor system. But he rather confuses the value of instincts and emotions by using the terms to apply to the same physiological phenomenon by maintaining that a minimum measure of emotional tone exists in all instinctive or impulsive acts, which is referred to the bodily resonance aroused by all such acts, and that some instinctive activities are more markedly emotional than others (21, p. 381). *Those instinctive activities "which are obviously of the emotional type* present instances in which emotion is largely confined, so far at least as concerns its immediate significance, to intraorganic disturbances."

Parmelee (25, p. 301) says "the emotions *are the feelings* which are aroused in the nervous system by these internal processes and the *movements of muscles, viscera, etc., which accompany the emotions*, are their causes." He made a helpful contribution when he divided the nervous system (as a sensori-motor machine, including

all its effectors as well as the receptors, into somatic sensori-motor and visceral sensori-motor systems, which are really identical with my division of the body as a sensori-motor machine into projicient sensori-motor and affective sensori-motor systems.

James (13, p. 383) says "instinct is usually defined (1) as the faculty of acting in such a way as to produce certain ends, (2) without foresight of the ends, and (3) without previous education in the performance." (1) refers to the use of the projicient motor system to attain certain ends. (2) implies a compound reflex act. (3) that the neurones functionate in inherent systematic associations without previous coördination of the association, being phylogenetically so determined.

Parmalee (25, p. 226), after an extensive digest of the subject, says: "in order to distinguish an instinctive activity from an internal physiological process it must indicate that an instinctive activity is an external activity of the organism . . . therefore . . . an instinct is an inherited combination of reflexes which have been integrated by the central nervous system so as to cause an external activity of the organism which usually characterizes a whole species and is usually adaptive."

Parmalee emphasizes the phylogenetically associated reflexes which control the activities of the projicient motor system and which are usually "adaptive" to certain ends. He also insists upon the necessity of differentiating an instinct as an "external activity," a function of the projicient sensori-motor system, from an "internal physiological process." The internal physiological process is referred to certain functions of the visceral sensori-motor system which he differentiates from the somatic sensori-motor system.

Judd (26, p. 213) says: "Coördinated activities of the muscles provided for in the inherited structure of the nervous system, are called instincts." The muscles are not specified as to whether they are the striped or unstriped systems or both. He explains the instinctive motor phenomena entirely through the existence of phylogenetically associated neurones and seems to assume a predetermined arrangement of neurones as a basis for the instinctive reaction.

Angell (21, p. 339) says: "Instincts have an origin *unquestionably similar* to reflexes. . . . It is impossible to draw a sharp line between them." He also depends upon a phylogenetic association of the neurones and the impulsive or reflex manner in which this associated train of neurones is started to work.

Pillsbury (27, p. 425) says: "*The term instinct is used to indicate*

all acts whose conditions are inherited. It matters not whether those acts may be referred to specific inherited connections in the nervous system or whether the act is the result of striving for an end which some innate predisposition compels the individual to strive for, and whose attainment gives pleasure." (Italics inserted.) This sweeping inclusion of *all* those motor functions whose conditions are inherited fails to differentiate, as an instinct, the digestive functions from the pecking functions, in the behavior of the newborn chick. Such formulations are also unsatisfactory because they depend entirely for the dynamic source of behavior upon a predetermined static type of arrangement of neurones.

In the sense that the newborn chick pecks with the point of its beak and does not put the food into its mouth with its foot or wing, its projicient motor functions are perhaps to be considered as coöordinated through phylogenetic or congenital associations, but in the pecking act, as a voluntary or involuntary phenomenon, we must look for the source of the desire or the motive for the act. This leads us again to the autonomic-affective functions.

It will be seen, upon an extensive review of the conceptions of emotions and instincts, that the division of an individual's behavior into functions of the autonomic and projicient sensori-motor systems is a step toward formulating a more simple, more dynamic comprehension of an organism's behavior, by following the tendency of academic psychology, but adhering more definitely to the autonomic (affective) domination of projicient (instinctive) movements. This behavioristic formulation is also far more consistent with the organic functions and structure of the organism.

McDougall (28, p. 26) says that "every instance of instinctive behavior involves (1) a knowing of some thing or object, (2) a feeling in regard to it, and (3) a striving towards or away from the object" which he calls (1) the cognitive, (2) the affective, and (3) the conative aspects of an instinctive act.

McDougall (28, p. 28) identifies the affective aspect with emotions; "each kind of instinctive behavior is always attended by some such emotional excitement, however faint, which in each case is *specific* or *peculiar* to that kind of behavior." The *specific nature* of the emotional excitement for certain instinctive reactions is essential to McDougall's theory.

He does not, however, attach to the affective element any dynamic properties and does not attribute a definite relation of the conative strivings to the affective reactions except that the conative

efforts are a striving towards or away from the object, but, it seems to me, he offers no explanation why.

"Each of the principal instincts (28, p. 47) conditions some one kind of emotional excitement whose *quality is specific or peculiar to it*; and the emotional excitement of specific quality, that is the affective aspect of the operation of any one of the principal instincts, may be called a primary emotion." "The affective quality of each instinctive process (28, p. 46) and the sum of visceral and bodily changes in which it expresses itself are peculiar and distinct." These opinions of McDougall give one the impression that emotions are considered to be *subservient* to instincts.

My dynamic theory is based upon the same physiological principle that is demonstrated in local anesthesia, wherein the part is not retracted (flight) when injured because it causes no painful disturbance. If a means could be devised wherein a local anesthesia could prevent the spasmodic adjustment of the diaphragm and viscera from producing feelings of fear (upon injury) the animal would not flee or feel any fear. In men who feel no fear in a dangerous situation we find no evidence of autonomic disturbance and in men who do feel fear a marked autonomic disturbance is observable and this is what they really flee from or try to prevent, and this process is active before the perception of dangerousness exists. The researches of Cannon and Sherrington, which have been so extensively cited, demonstrate the peripheral origin of the affections, as in hungriness, the desire to urinate, sexual craving, etc.

Watson (10, p. 106) says "an instinct is a series of concatenated reflexes. The order of the unfolding of the separate elements is a strictly heritable character. Instincts are thus rightly said to be phylogenetic modes of response (as contrasted with habit, which is acquired during the lifetime of the individual). Such a series of reflexes, or an instinct, is best illustrated by the young bird's egress from the egg, and its later attempt at building a first nest."

This conception of an instinct includes the activities of the autonomic system as well as the cerebrospinal or projicient and is as inclusive as MacDougall's conception but it places no emphasis on the dynamic importance of the affective factor.

In his discussion of affection as a form of instinctive behavior Watson (10, p. 24) details the neurophysiological mechanism of sex excitement. He traces from the sex changes in the circulatory, glandular, secretory and muscular mechanism afferent impulses—"which upon reaching the motor centers produce the actual seek-

ing movements in the striped muscles." The afferent impulses are "the bodily substrata of the emotion of pleasantness." This is essentially the mechanism of my dynamic theory if to it is added that *important* factor that the skeletal muscles are compelled to expose the proper sense organs to appropriate stimulation so that the affective or autonomic disturbance will be neutralized. *The process of neutralization of the affective disturbance is the dynamic principle underlying all behavior and not the inherently concatenated series of reflexes.* Watson's simplification of the organic machine into a problem of stimulus and receptor-effector response seems to have obscured the importance of the affective mechanisms.

Holt (29, p. 98) in his discussion of the physiology of the wish says "*thought is latent course of action with regard to environment (i. e., is motor setting), or a procession of such attitudes.*" "Will is also course of action with regard to environment, so that the only difference between thought and volition is one of the intensity of nerve impulse that plays through the sensori-motor arcs." "Thought is the preceding labile interplay of motor settings which goes on almost constantly." In "wish or function we have the pure essence of human will and of the soul itself. No distinction can be found between function, wish and purpose." The wish is "a course of action which the body takes or is prepared (by motor set) to take with reference to objects" (29, p. 94).

Holt's conception of the origin of the wish, will, emotion, purpose, etc., in the motor functions does not specify the *autonomic* sensori-motor functions, but his discussion hardly leaves any other inference. His definition of thought as the preceding labile interplay of *motor settings* certainly must be the same as the kinesthetic stream arising from the postural tonus of the skeletal muscles, as they react to the afferent influences arising from the autonomic sensori-motor or affective changes. Herein we have a physiological explanation of the wish determining the thought—the affective craving being the wish or dynamic principle.

My theory maintains that the movements of the projicient sensori-motor system are compelled by the affective disturbances and become a *means* to acquire stimuli which will reestablish a comfortable affective state. The status of affective comfort is the *end* state of the dynamic striving, if the unsuitable term "end" may be used here.

McDougall and other psychologists have not mentioned this self-neutralization principle of the affective compulsion.

Characteristic Affective States and Their Influence on Behavior

The description of symptoms of affective cravings or emotions has been unprofitably overdone by psychology and psychiatry and is not desirable here. The dynamic aspects of affective states only are discussed in the following.

Affective reactions may be looked upon as largely autonomic postures in which the entire autonomic apparatus may play a part, although the actual feelings at first seem to emanate from one visceral area, as hunger, nausea or disgust starts in the epigastric region. Continued hunger may become associated with feelings of weakness, headache, irritability, etc. It has long been recognized that one characteristic affective state may become adulterated by another and even obscured by a second or third superimposed reaction.

The biological career of the autonomic apparatus, considering the organs it has gradually evolved through specialization of its functions, is, imperatively, to preserve and reproduce itself. The dynamic organism has grown from one functional stage to another. It is constantly exerting pressure upon the environment, upon which it must maintain itself, in order to fulfill its biological decree. Hence its more simple reactions tend to be comparatively temporary unless the affective reactions should become conditioned to react to something which is constantly in the environment, as fear of arrest for a crime, or censure for a wrong, loss of position for insubordination, etc.

The affective reactions of fear and its variations as shame, sorrow, disgust, anxiety, anguish, sadness, jealousy, pity and meekness, are all due to some kind of noxious stimulus and exist so long as the organism fails to protect itself.¹

Forms of rage, such as anger, hatred, indignation, which are principally variations in intensity, are all compensatory protective reactions following the fear reaction caused by a painful stimulus.

The pain stimulus may arise from within the individual (as unskillfulness) as well as from the environment (insurmountable resistance).

Fear.—*The fear reactions always tend to remove the receptor from the painful stimulus and continue the retraction until the organism has succeeded in obtaining neutralizing stimuli for its receptors.* Many animals when frightened dash into a familiar hole

¹ Watson, J. B. (30, p. 165), suggests that fear and rage and love in the Freudian sense are the fundamental affective reactions to be found in the infant.

which cuts off the painful stimuli and immerses the receptors in comfort-giving stimuli. Birds and many animals depend upon weakening the stimulus through interposing distance. Young animals not having the power to escape, often go into catatonic-like states in which the posture, drooping ears, diverted or closed eyes indicate an affective flight within the organism away from the pain-giving receptors, thereby increasing the affective reaction threshold to the stimulus. For the criminal to faint when being executed is popularly regarded as a form of escape or cowardice.

Puppies, young monkeys and other animals when frightened by the threatening posture of a more powerful animal of the same species often assume a state of complete submission with exposure of the throat, abdomen and vital organs to assault without signs of defense. This helpless posture of the young seems to relax the aggressive posture of the adult because it is made excessive by the complete submission. Terror and panic are extreme forms of fear in which the organism cannot make well coördinated efforts to escape.

Anger.—Forms of anger (indignation, hate, rage) always tend to remove the painful stimulus from the receptor and continue to do so until the stimulus is sufficiently altered so that it no longer is a potential threat, but is harmless. The removal may be effected by driving it from the environment, destroying its consistency, or, if it is a threatening posture in another animal, the removal may consist of merely changing the aggressive posture of the opponent into a submissive one. In the social relations of man this assumes interesting forms to be found in requirements for subordination, retractions, apologies, "the last word," bluffing, slander, subtle dominations, etc., obtained by overt or implied threats.

Anger may be directed upon a disagreeable habit and lead to severe self-mutilations to destroy the habit because it is a form of painful stimulus—as self-castration for masturbation.

The motive for the destruction of the painful stimulus may not be obvious in a man's reactions until an analysis is made of a situation. For example, a physician's daughter (age three) disappeared in the wooded grounds of an asylum where many insane men and women had the freedom of the grounds. The father of the little girl with several other physicians were about to start a game of tennis when the child was missed. A general search was immediately started. We all showed unmistakable evidence of fear reactions in our facial pallor and tense looks. The common cause of the fear was the possible seduction of the child. Being inter-

ested at the time in the compulsions arising from affective disturbances I analyzed my reactions. What I called fear was caused largely by a seemingly continuous very uncomfortable stream of sensations located about the epigastrium and stomach which had to be removed. Although it apparently did not inhibit my breathing I could not easily vary the amplitude of inspiration or expiration. Something like a static diaphragmatic posture or tension resisted it. Only one thing could remove it—the acquisition of the child—safe.

As I hurried through the ravine fancies of myself encountering the assailant were already preceding the reality and the compensatory nature of the preparation for the encounter was decidedly that of anger. Additional fear reactions, caused by the unknown nature of the offender, necessitated that the compensatory angry compulsion to punish (or destroy or capture would be a potential punishment also) should become intensified.

When I had passed through the ravine and came out onto the open grounds the secluded back of a building suggested a possible hiding place of the child. Visions of a possible fight faded away, and as I hurried along visual images of children mischievously hiding from their parents were presented by the shifting affective state.

Now the blame for the painful fear reactions was quickly shifted upon the child herself and anger began to attack the child with fancies of punishing her. Since she was not my child other affective inhibitions urged a compromise by suggesting that she should be punished for running away and causing so much discomfort, so that it would not be repeated (herein lies the angry destruction of the painful stimulus). But the age of the child made her irresponsible and so the anger, which would by this time have relished giving punishment, again had to be diverted. I was now joined by the father and naturally he said something about insane patients and children, and wandering children. A minute later we rounded the corner of a building and there we found the children playing with some of the women who had started in the searching party. The next thing said by one woman, after she explained where the children had been, was that she thought they should not be punished, for they were entirely innocent, having merely taken a walk with one of the women. Evidently this was the woman's answer to her own anger and tendencies to punish as well as ours.

All such situations are composites of numerous stimuli and pass through a series of transitions. Our affective reactions occur

reflexly. I was clearly aware of fear being superimposed by protective anger which would prevent a recurrence of its cause.

After the tennis game several players commented that the "excitement" had spoiled the tennis playing. In myself it seemed as if the anger had not had time to be assimilated and it caused incoordinations which showed in my own difficulty to concentrate on the game.

Anger is essentially destructive, although it may be elaborately and persistently constructive in order to ultimately attain the satisfaction to be derived from the destruction of an object or some person's attitude. A man may work for half a century to acquire a fortune or reputation in order to ultimately wring a submission from some one. Anger has a tremendously aggressive value if its energies are so controlled by other emotions that it must expend itself through constructive work.

Self-protective anger may be aroused by the discomfort resulting from *any* affective craving failing to acquire necessary stimuli. This additional aggressive component may then make the acquisition possible by overpowering the resistance.

We speak of expending our anger, or letting it out, as if the chief pleasure resulted in giving it free play or projecting it. This is in a sense true, but in the loudly, harshly spoken phrases is the need of having the victim react with discomfort (pain) to the phrase. Often a medium is depended upon to transmit the evidence of our feelings. The mere emission of the hostile phrase is evidently *insufficient* because of the tendency of hatred to continue uncomfortably within us whenever we fail "to get satisfaction." The indifference of the object for our anger is torturing. Few people, however, are highly enough integrated to take advantage of the value of indifference to an assailant's anger.

Shame is a type of fear reaction (a retraction) caused by the misapplication of stimulus and receptor for which is felt a certain responsibility, as in error, stealing, lying, perversions, etc. The protective compensation for shame is in escape or flight through repressing (forgetting) the experience, or compensatory atonement. This entails a form of functional castration in that, after affective shame repressions are made, the personality no longer has free use of the experiences or affections that led to the shame experience. This may have a beneficial or detrimental influence. It may be accidentally instrumental later in successful reactions because of ability gained through compensatory striving, or it may lead to excessive timidity and failure.

Disgust seems to include elements of fear and anger reactions and is caused by the gastrointestinal defensive-emissive movements. When we feel disgusted with the appearance or behavior of anyone, the attribute of wasted material or wasted energy is in some manner included in the appearance or behavior (inefficiency) of the individual. Efficiency never arouses disgust. It always arouses admiration, even in an enemy; whereas inefficiency tends to arouse disgust, even in a friend who of course compensates by making sympathetic demonstrations.

That contempt for inefficiency, extravagance and wastefulness should be associated with spitting, vomiting (nausea and disgust), urination, defecation or purulent discharge is obvious. Olfactory, gustatory, visual, auditory or tactile stimuli may, by association with waste material, arouse emissive reactions and are spoken of as disgusting. (See conditioning of affective reactions.)

The expression of *disgust*, through overt emissive movements or implied emissive feelings in the adjectives attributed to an object, may be illustrated by a young woman, who in expressing her disgust and contempt for the behavior of another person, reflexly made vomiting noises and movements in association with the words declaring disgust. One not infrequently hears phrases comparing or associating some work or person with excreta, as expressions of disgust for the work.

In the emission of the stimulus, casting it off from the organism, is to be seen a type of anger reaction. In misers and those types of epileptics who are anal erotic, one finds a deep chronic hatred for the constructive interests of society. (The compensatory affective reaction for disgusting, wasteful tendencies in the self or in society is the development of system, conservation, hoarding, and scrupulous cleanliness.)

Sorrow is a form of fear reaction caused by the loss of a pleasure-giving stimulus; that is, the inability to retain or expose the receptor to the lost stimulus. The compensatory striving is obviously for the acquisition of another pleasure-giving stimulus.

Joy is an affective state caused either by the disappearance of a potential pain stimulus or the acquisition of a positive pleasure stimulus. The disappearance of a pain stimulus is reciprocally followed by the acquisition of a returning pleasing autonomic status.

Anguish is a complex affective reaction which seems to contain traits of fear, shame, sorrow and anger reactions. A girl who spoke of her emotional state as "anguish," which endured for months, said it was due to her selfishness and masturbation (shame), which she

imagined was causing the death of her family (fear). She wept bitterly (sorrow) for her wrongs, and seemed to become, at times, desperately angry at the habit she was trying to destroy. In anguish, there seems to exist a serious anger reaction, which is turned upon the self, because, in some manner, the self is partly responsible for the failure. In such cases, sorrow is not directly the result of masturbation, but the result of waste, for having lost a sense of refinement, dignity and self-confidence, through the misapplication of receptor and stimulus.

Love is essentially a form of affective hunger and in man at least, like hunger, tends to be consistently recurrent. Its dynamic pressure is almost constantly felt in some form and its influence upon behavior, when unadulterated, is reproductive, constructive, creative. Repression of love reduces creativeness. Its genesis, like food hunger, is dependent upon the metabolic (reproductive) functions as well as the environmental stimuli in the sense that, like food-hunger, love hunger may be felt in a completely neutral environment which is not characteristic of other affective reactions. Love demonstrates its constructiveness in reproduction and maintenance of the species, race, clan, community, religion, family, business, reputation, etc. It is the urge behind the progress of civilization. Although many of the progressive innovations of civilization are the creations of anger they have been cherished and retained by love of efficiency and progressive refinement.

Love, as an affective state, causes intense suffering (fear) if the organism is unable to acquire or retain a suitable love-object. Like all other affective reactions it becomes conditioned to respond to certain stimuli of certain receptor zones, which in some individuals may differ grossly from the normal, gradually requiring almost specifically defined stimuli to produce a state of affective comfort. In these needs it exerts a marked acquisitive and avertive influence upon the attitude of the personality toward the environment. The same principle of the affective state acquiring a comfort-giving stimulus for itself is seen when the mother is horrified by her dirty child, then cleans, pets and dresses it until its status delights her, or the mother cat caresses its kitten into relaxation or nurses it to sleep; or in the loyal sacrifice in order to further a cause or attain an end—for honor, which however must not be admitted, for then the sacrifice would be selfish.

It has been noted that objects that pertain to the waste of foods, energy or time, etc., arouse feelings of disgust, and we give them descriptive adjectives that have an origin in the emissive functions,

as "rotten," "dirty deal," "putrid," "foul." On the other hand objects that give us delightful stimuli, which we like to assimilate, are given descriptive terms, such as sweet, good, wholesome, etc., expressing the assimilative reactions they arouse in us. Girls like to speak of sweet colors or sweet dresses because their "mouths water" when they look at them.

If a buyer or seller, while bartering, is unable to prevent the prospective fulfillment of his own wish from making his salivary glands secrete ("mouth water") the party, whose consent to the trade is necessary, becomes suspicious that he himself is abandoning a tempting morsel and reacts with fear of making a losing deal.

Jealousy and envy are mixed affective reactions of pride, love, fear and anger. The loss of the love object causes pain and fear with feelings of inferiority, and anger tends to punish the cause of the pain.

In the above discussion of the dynamic compulsion of an affective state upon the organism to acquire suitable stimuli and avoid unsuitable stimuli the term instinct was found unsatisfactory in the sense of fear arousing the instinct to flee. If an instinct is a series of concatenated reflexes, the variations of the reflexes used in flight are so enormous that the term (as an inherent concatenation) is not at all acceptable. We may have very similar overt movements in flight, attack or play. It seems more satisfactory to speak of the compulsion to acquire neutralizing stimuli, thereby recognizing the variation of movements for acquisition and aversion.

Since acquisitive and avertive tendencies toward the useful and useless stimuli in the environment are constant attributes of every affective state, and since we may have a quite complex affective status at one time, the complicated nature of even ordinary spontaneous behavior is apparent. *The behavior observed at any period is the resultant or compromise of the various affective trends active at the moment and is always symptomatic of the affective state.*

Studies in psychopathology have shown that *not only does the affective status avoid or use things in the environment but it also tends to avoid or use certain divisions or functions of the projicient sensori-motor system.* For example: Some people live mostly in their flexor (submissive) and others in their extensor (aggressive) muscles. Awkward people tend to avoid muscular exercises because of fear of embarrassment. Early in life we tend to specialize on relatively a few skillful movements and avoid developing others in order not to betray our functional or organic inferiorities. Since the tendency to perfection comes only with practice most individuals

become victims of a vicious circle. Congenital defect or inferior organic construction may increase the tendency to disuse, hence it increases the inferiority (31). *Fear of using a function or of permitting an affective reaction free play constitutes an inferiority as well.* Fear of allowing love free expression tends to inhibit creativeness. This is essentially the mechanism of biological impotence to be seen almost universally in males who have been intimidated in their youth by older females or males. Frequently a hatred compensation is developed as a protection in order to use its additional energy to overcome the social resistance and timidity.

Affective aversion for an organ or a sensori-motor division tends to cause its atrophy through disuse and makes it become a potential source of disease, as functional paralyses, or phthisical chest of the timid and seclusive, liability to failure or injury in the timid.

We see this aversion also in affective resistances producing anesthetics of any receptor field, disuse of any motor division, inhibition of visceral functions. On the other hand affective acquisitiveness may cause a painful hyperacuity of a receptor field or hypertrophy of motor divisions. The same principles are manifested in our aversions or preferences for names, words, phrases, languages, studies, vocations, communities, lines of travel, hobbies, people, dress, mannerisms, politics, religions, etc.

The affective dispositions of most people are usually not so complex that the principal trends are not symptomatically apparent. We read them in the postural tonus of the muscles of the face and body. Smiles, looks, frowns, scowls, lines, the contour of the nose, lips, chin, the muscles about the eye, the mannerisms of the eye, furrows between the eyes, tilt of the head, posture of the shoulders, mannerisms of the hands, the grip, fingers, the style of the nails, the stride, the sound made by the foot, the voice, dress, style of phrases and general interests are manifestations of the postural muscle tonus which has its dynamic determinant in the autonomic posture or affective disposition of the individual.

Instantly the postural tonus varies as the affective disposition varies. This is best illustrated in accidents. A man, while shaving, was holding an open razor in his hand, a remark by a companion caught his attention and the razor dropped. As it was approaching the floor he reflexly made a dangerous grab for it. The postural muscle tonus that held the razor in a light grip was determined by an affective state. The remark caused a disturbance of his affective tension, the postural tonus of the fingers reflexly relaxed slightly and gravity instantly pulled the razor out. A butcher was pressing the

point of a heavy knife into a joint of beef to dismember it. He was brooding at the time over the remark of his superior in charge. A remark of some one caught his attention, the postural tonus of the gripping hand was relaxed slightly for an instant, but sufficiently for the downward pressure of the arm to force the fingers off the handle and down the knife blade. He received a disastrous slash in the hand.

A manufacturer informed me of the following accident. His most reliable planer had his hand torn off in a machine. This man had the reputation of never having had an accident during many years of service. The night before his wife had gone on an escapade with another man.

In vocations and games requiring accurate, delicate, skillful coordinations, such as golf, tennis, shooting, aviation, etc., the proper postural setting of the muscles ("good form") are recognized to be of the utmost importance and are impossible to maintain when one is distracted by affective disturbances.

The posture of the ambling, lolling, lazy, indifferent man is in marked contradistinction to the tense, erect, stiff figure of the sensitive, proud, ambitious, striving man. The feelings of muscular weakness and loss of muscle tone in the fearful, and the firm muscle tone and feelings of power in the confident are further examples.

The postural tonus of the handshake may reveal the insincerity of the greeting by its flabbiness, quick withdrawal, slight push, overcompensatory tenseness, etc. The smile of a supposedly pleasant welcome may reveal signs of effort or an ominous exposure of the incisors, because with the desire to extend a welcome is active irrepressible unwelcoming affectivity.

The aggressive pose of anger, the timid retractiveness of fear, the spontaneity and exuberance of joy, the retarded movements of depression, the relaxation of indifference, the set of attentiveness are further illustrations of the postural tonus of the skeletal muscles as determined by the autonomic-affective state.

The extreme delicateness or sensitiveness with which postural tensions react to stimuli is well illustrated by the manner in which we miss the subliminal stimuli, the more delicate qualities of pitch, timbre and rhythm when listening to music, if we cannot adjust our muscles freely so they may assume rhythmic tensions similar to those being rendered by the musician. When we are disconcerted by an uncomfortable chair, a high collar, a tight shoe or a dull, wheezy companion, we are unable to react to the strains of classical music. The manner in which every individual, who develops the

capacity to react to classical music, goes through a process of training, shows that the delicate, nervous integrations, necessary for postural reactions, are acquired in the same manner that other skillful movements are acquired, through the survival of the fittest integrations that please the affective craving for music.

Hence motifs in music, not only become associated with dominant motives in behavior, but certain motifs can never be enjoyed by certain types of people because of the resistance of their affective cravings, considering other capacities as being equal. While writing this part of the discussion, an agent, whose business makes it necessary for him to look up data in our office, entered the room. He habitually speaks with a most unusually cultivated, mushy cast of voice and upon almost every occasion the workers in the room who did not have to respond to his questions showed unmistakable avertive reactions by the manner in which they twisted in their chairs. After the man left on this occasion a general series of commentaries verified the fact that the mere sound of his voice had aroused wishes (autonomic aversions) that he should leave. This unfortunately posed man probably has suffered intense anxiety to know why his presence causes an aversion for him and has probably never been able to understand the difficulty or to change it.

The ability to read character varies enormously in different observers, and also in the same observer at different times. When our wishes persist in idealizing another person his deficient traits, which may be very obvious to others, are persistently overlooked. An affective resistance in us makes us have a functional anesthesia for them. On the other hand, the analytical cynic does not necessarily make the best reader of character, although he may be keenly proficient in detecting the inferior traits in his subject, the wish-fulfillment, in himself, to see deficiencies in others, may make him anesthetic to the constructive powers in the individual. By developing the capacity of preventing oneself from making either positive or negative affective transfers to the individual, and by carefully avoiding the subject's endeavor to win a transfer from us and recognizing it when it occurs, we may be able to study an individual's character without unduly influencing him to conceal his deficiencies or to overemphasize his powers. In reading character, the observer should maintain a firm altruistic attitude in himself, so as to impartially estimate the subject's powers for social and personal constructiveness, and, recognizing that always the individual must strive to reform the more primitively selfish, cruder tendencies in himself, he must estimate the subject's deficient traits with the object of

learning how much he *has yet* to accomplish—not how much he has failed to accomplish. This last point is extremely important, because the observer, himself, as an animal competing in the universal struggle for social power, may yield, unconsciously, to the temptation, being an opponent, of estimating his subject's deficiencies in a pessimistic light. Thereby, he would be subtly relatively elevating his own rank in the social herd, and his observations might be inaccurate.

The true estimation of a subject's affective responses, for example, when he spontaneously shows that he is pleased, depends upon seeing how *gently* or *spontaneously* he exposes his teeth. It is most important to recognize the nature of the tension in the posture of the lips.

Let us take a smile and analyze its affective significance. It is one of the most observable manifestations of the affective state of the individual and is far from being simple, unless camouflaged behind a mass of hair. One thing to be estimated is, how much too much or how much too little does the individual habitually use his lips to mask his more sincere affective reactions. One thing is certain, most individuals can only afford to hide their selfish interests or asocial reactions. We are glad, indeed, to permit our altruistic impulses to show themselves, when we have them, because they have everything to gain and nothing to lose. Through improving our friends and the herd, we improve ourselves. Because of the consciously disguised movements of the lips in most adults, when being observed, children and adolescents alone may be satisfactorily studied, unless one can be honest with himself. In regard to accurate estimation, through impression, of the degree of reflex responses, I am reminded of two specialists in nervous diseases who disagreed in their opinions as to whether or not a patellar reflex was increased or diminished in its responses—not a rare disagreement; hence, impressions as to the affective significance of the movements of the lips are to be expected to vary somewhat with the observer's affective state.

The two important features of the smile seem to be the *spontaneity* and *gentleness* with which the lips are exposed when the eye is looking honestly at the observer; and second, how much of this muscle group is used in the revelation of having been pleased. Many people smile with difficulty, revealing a sinister resistance through a miniature snarling exposure of the canines, others use chiefly the corners of their mouths, some the upper lip or the lower lip, others the right side of the mouth more than the left, and still

others attractively purl the middle of the lips while their friends gush all over.

The word "smile" may have a commonly accepted meaning for many, but the spontaneous act of smiling is different for each individual. The contours and tensions of the lips are minutely determined by a complex affective pressure. The shades of its tensions are so difficult to read accurately that one is not surprised that astute physiologists and psychologists should crudely classify most smiling, laughing, crying or cursing as having a simple significance. The postural tensions of other muscle groups, such as the eyelids, nose, cheeks, chin, posture of the head, shoulders, etc., make important revelations of the complex affective character of the individual. Artists have always recognized these facts but scientists have stupidly avoided them.

The manner in which the affective cravings become conditioned so as to be aroused in a complicated manner by one complex situation has been covered in the study of the mechanism of conditioning the affective and autonomic reactions. The mechanism by which complex affective cravings are established and retained is next to be considered.

Affective Repression and Fixation

Through the psychoanalytic method of studying psychoneuroses, it was first recognized that functional derangements or symptoms disappear after an adequate affective readjustment is made, and that while the affective readjustment is in progress the individual becomes aware of forgotten memories and old desires to do certain things. Usually the history of the genesis of the desire is such that it conclusively, in a sense logically, explains the cause of the symptoms and why they should disappear when the craving subsides. Such phenomena are only intelligible on the assumption that the craving, or affective compulsion, because of the persistence of the symptoms or tendencies, existed somewhere continuously from the time of its genesis until its readjustment. Since the affective craving has a remarkably persistent tendency to remain true to its original form upon its recall, and since it disappears or subsides after an adequate readjustment, it is reasonable to conclude that the affective craving persisted after its genesis in something like its original form, because it was not permitted to adjust itself. Since the host had no awareness of its nature or origin (after the repression) but only felt its symptoms, it is also reasonable to consider that it may

have continued its repressed existence in the autonomic functions of the organism.

If the origin of the affections lies in the peripheral functions of the autonomic apparatus then we may turn to the autonomic apparatus for an explanation of the physiology of repression and fixation of the affective craving. Since the craving or wish is really one's consciousness of the autonomic proprioceptive activities, as they are aroused by the contractural and postural motor functions, we may look for the physiological source of the repressed but enduring affective craving in the persistent (heightened) postural tensions of the autonomic musculature; the type of the craving being determined by the autonomic field involved. There seems to be no reason why the increased or lowered tonus of a viscus might not continue indefinitely. Crile has pointed out that this is indicated in certain forms of hyperthyroidism and Sherrington has demonstrated the relative unfatigability of postural tonus of muscles. The spastic hypertonic or hypotonic derangements of cystic, gastric, rectal and laryngeal musculature definitely support this conception.

We may therefore assume that, *when an affective craving is repressed by fear of the consequence of permitting it free play, the larger part of the organism, which is not the source of the craving, prevents the autonomic field, which is the source of the craving, from adjusting itself by not permitting it to dominate the projicient sensori-motor functions; thus preventing it from acquiring such stimuli as are necessary to bring about the adjustment of its tension.* This constitutes the functional neuroses, as the spastic gastritis, colitis, dysmenorrhea.

A craving or wish may be said to be *repressed* when it is not permitted to cause *awareness* of its needs, whereas it is *suppressed* when it may cause a *vague awareness* of its needs. This theory of the physiology of the repressed affect explains the cause of individual postures and those peculiar eccentric traits of individuals by which some are conditioned to continuously have undue affective or autonomic reactions to certain stimuli while others are indifferent to them. The traits of predilection for, or hypersensitiveness for, certain types of things or situations seem to be due to the conditioned nature of some hypertonic autonomic field. Sherrington has shown that when a segment is in a state of increased postural tension it will react to certain subliminal stimuli—as the abnormal sensitiveness of secret shame or guilt.

When the autonomic sensorimotor system reacts to a painful situation with anger-producing functions and the compulsion to act must be restrained to avoid a greater difficulty, one may feel

for hours the visceral and bodily tensions, loss of appetite and discomfort. The compulsion to act continues unmistakably recognizable in a characteristic, persistent disconcerting stream of thought, and a tendency to make incoördinated movements and mistakes. Such phenomena certainly indicate the persistence of the postural disturbance.

Since the repressed affect becomes a painful, disconcerting influence in the personality, the psychopathic individual may usually be relied upon to furnish evidence of the final outcome of the autonomic disturbance, because he suffers until relieved. The comfortable (trained) introspectionist cannot usually afford to be completely truthful because it would be horribly embarrassing, hence introspective academic psychology has been sterilized and conventionalized. In case of repressed affections of any intensity we find persistent autonomic derangements manifested in such conditions as loss of appetite, gastric irritability, tendency to nausea and vomiting, diarrhea, dyspnea, headaches, cardiac palpitation, blushing, disturbances of menses, insomnia, general hypochondriacal complaints, eccentric physical attitudes, long-enduring, gross, psychoneurotic derangements, etc. In the case where the repressing fear influence is analyzed away and the repressed affect is at least permitted free play one observes the repressed affect coming forth like an uncoiled spring of activity and it completely dominates the personality until an adequate affective readjustment is made. Following this readjustment the individual, with apologies, often expresses surprise that his discomforts should have disappeared. The functions of the autonomic system seem to have become adjusted back to their norm. The postural tenseness, as shown in the features, movements, visceral feelings, etc., disappears. *The repressed affect seems to be stored, like the energy in a compressed spring, in the heightened postural tension of some division of the autonomic apparatus.* In this manner all our memories are probably stored. Perhaps in no function is the persistence of the hypertension of a muscle group, upon affective repression, so obviously demonstrated as in the persistence of an aresonant voice after repressions of an angry impulse to speak. This aresonant or avibratory condition, judging from the feelings of laryngeal tenseness, is due to a hypertonus of some of the voice-producing muscles.

If the affective repression involves interests which are part of the daily life of the individual, as in his love-seeking, an affective fixation occurs of which the personality, no matter how much it attempts to disguise the influence of the repression, is never able to entirely escape awareness. Such characters often make

themselves into romantic heroes to compensate. The repressed affect seems to remain in its peculiar *status quo* throughout the existence of the personality unless an affective readjustment is brought about in some manner. This is particularly manifested in the repression of a painful love. Years later the individual, who may have developed the compensatory traits of a wit and a wag, may succumb to depression, or should he attempt to make love again he must master the anxiety of the previous love affair. The influence of the repressed affect is often unmistakably revealed in dreams and sincere artistic and literary productions, which of course can only occur when the censoring affect tolerates the disguise used by the repressed affect.

The principle of opposition of forces or conflict of functions is as old as biological structure and as basic. Even in the automatic reflexes we experience functional conflicts as in biting our lips and tongue, or swallowing food into the trachea, or sneezing when drinking, which phenomena one may readily observe in himself to result from affective confusion or conflict. Sherrington (1, p. 145) has emphasized that "each instance of convergence of two or more afferent neurones upon a third, which in regard to them is efferent, affords . . . an opportunity for coalition or interference of their actions." The currents in the affective stream, because of their continuity and complexity, tend constantly to oppose or reënforce one another as they converge to dominate the behavior of the projicient sensorimotor system.

The importance of *conflict* in the affections of a personality becomes manifested in its childhood, as soon as it begins to socialize itself and consider another's approval of its wishes. The age when this tendency begins depends largely upon the moralizing attitude of the parents and their methods of influencing the child to adjust itself. In modern civilization, man having so thoroughly mastered his environment through his mechanical inventions, the individual's great struggle in life is not so much a problem of self-preservation in a physical sense as it is one of attaining social approbation, and potency. Hence the greater proportion of the personality's affections gradually become socialized or socially conditioned and any asocial cravings tend to be inhibited or repressed by them.

There has never been a tendency in the history of man, as a species, that can be considered to have been at all characteristic of the species, for individuals to live a totally isolated or independent existence from all social herds. Man's gregarious, herding proclivities helped to make him stronger than the beasts and the ele-

ments. The group cherishes the individual for the help he can give it and this is largely the nature of the relations between one man and another. More than this psychologists and sociologists have not emphasized.

The *transference* of affection between individuals is perhaps of even greater importance than physical assistance, except when the individuals are pressed to a desperate struggle for life. In the past few years psychopathologists have learned to recognize that upon the nature of the affective transference required by the patient practically the whole prognosis of the psychosis depends. That is, if the transference, in its specific requirements, belongs to a type that must be tabooed the prognosis is proportionately discouraging. It is the inherent autonomic or affective disposition of every personality to need from some other personality, fervent, *spontaneous* demonstrations that its existence is wanted and its nature approved. No matter how substantial is the contribution to social improvement, one cannot be quite satisfied, until from some esteemed source is received a sign of approbation. In some subtle manner, we tend to seek for it. *The craving for such an affective transference is vital, and its gratification is the only method of giving the personality a sense of well-being and social fitness.* Men who would think for themselves are abandoned until they prove their truth, and the frigidity of the social void is too terrible to be braved except by the most courageous. Whether or not the tendency to socially ostracize or torture any member of the herd who strayed slightly out of bounds was characteristic for the species since its existence, may be conjectured from history. It is well established, however, that the affective need for a *transference* begins with nursing and probably becomes a fixed attribute of every adjustment in adult life, because of its firm development through the long years when the successful struggle for life depended entirely upon the affections of another personality. As society increases its care for the individual, and the individual for society, in order to prevent disease, waste, and degeneracy, poverty and usurpation of privileges, the individual grows more and more to need social esteem in order to feel safe and comfortable, and less and less to need the mystic's encouragement. The characteristics of the individual's family group, while he is developing, becomes the prototype for all the future selections for affective transferences of both the positive and negative nature. As experience increases the dimensions of the personality, the ramifications of affective transference become very intricate, but the principal love and hate objects in maturity have easily traceable associations, in frank people, to the love and hates of childhood; like the branches

of a tree arising from the trunk but having their extensions into space directed largely by the environment.

The history of the human race is full of accounts of terrible punishments of independent thinkers by the community; hence, one would feel that the corollary of this censuring would be active in each individual, to live, as much as possible, so as to retain society's approbation and, if possible, win society's esteem. Hence, asocial individuals find safety in numbers, and clique together into a society of their own, so as to be held in some esteem. One of the most persistent causes of anxiety and depression in the individual is the fear that he has lost prestige through a blunder or a vicious indulgence. In psychotherapy the most essential means of helping a patient to make an adequate affective readjustment is the establishment of an *altruistic transference* (48) between the patient and physician.

When an affective transference is broken between two individuals, as an employer and employee, anxiety is at once observable in the most dependent member of the transference and probably in both.

In mating, well-constituted males exuberantly make heroic sacrifices of power and health in order to retain the love of their mates. They are really happy slaves of their transference. When the transference is broken they are hurled immediately into despair. This mechanism is a most fundamental force in the evolution of character and personality, and the genesis of affective healthfulness or of an affective diseased state.

The individual's cravings for social esteem or approbation become the most manifest and dominantly active of all the autonomic functions, in that the individual is *always* being made aware of their needs, by their activities forcing him to do the things that will maintain or win approbation. The wish for social approbation is gradually cultivated to qualify every sexual or nutritional craving and determines that the sexual and nutritional wish shall not freely dominate the whole organism and compel it to do something that would earn the everlasting damnation of society. The herd, beginning with the parental influence in the home, trains the individual so that its strivings will contribute to the general progress of the herd's development. The infant's nursing and elimination cravings are early counterbalanced by developing wishes to please the mother, hence control the nutritional and sexual cravings. The child quickly learns that whenever it disappoints the mother or father it loses its source of sympathy and encouragement. That is, it injures itself by depriving the wish *to-be-loved* of its gratification. The child's

wish *to-be-loved* is vital. Practically its entire mental development, as anyone can see in himself, until long after maturity, has been influenced by the need for love and esteem. After maturity most adult males prefer to substitute the words honor, esteem and power for love.

The mechanism of the "*transference*," which is the key to successful psychoanalysis and psychotherapy, depends upon the physician's ability to sincerely appreciate the patient's emotional conflict. He must genuinely wish to assist the patient for his welfare and the welfare of society. The analysis must proceed upon a clearly defined altruistic basis. The physician must not become a censor or moralist, or temptation. He must remove, as soon as possible, the patient's fear of losing social approbation in order that the repressed functions may manifest themselves. The physician represents the highest reconstructive interests of society, hence, so soon as the patient confidently feels that the revelation of his wishes will not lose for him the physician's esteem, he promptly begins to show relief from anxiety; that is, relief from the pressure of affective cravings that he has repressed (that he tried to forget).

The Origin and Evolution of the Ego and the Will

Very early in childhood the autonomic apparatus begins to struggle to control itself so that the *individual* autonomic cravings, as the desire to steal, urinate or defecate, will not cause the loss of the esteem of those it loves most (mother, father, brother, sister and friend), by exposing them to obnoxious, disgust-arousing stimuli which in turn would arouse an aversive affect for the child.

This peculiar striving of the autonomic apparatus, to act as a *unity* in order to control an individual segment, develops gradually, and should be regarded as a compensatory reaction, in order to, directly, avoid the causes of pain and fear and, indirectly, retain love. When the child has developed the power to reliably control the more simple autonomic adjustments, such as the eliminative, it achieves its first great social triumph. When this capacity becomes so soundly established that no doubtful feelings remain, the individual's strivings become reversed and feeling its sense of power it begins to strive directly more and more to win love and esteem and indirectly to control itself. The supreme triumph comes with the gradual compensatory development of the power to control masturbation, usually from fourteen to eighteen. This compensatory mechanism applies also, obviously enough, to perverse sexual and homosexual interests and must not be considered in the sense of applying merely to the act of masturbation but to all the fancies,

movements, interests, associations, etc., that are related to autoeroticism. Most boys, when they conquer the autoerotic cravings, develop an aversion for all the associations that are connected with them and compensate with high resolutions to enrich society.

One must therefore see that slowly but incessantly from infancy the autonomic apparatus develops, through integrating itself into a *unity*, a compensatory capacity to control the more individual segmental cravings. These compensatory cravings, through being conditioned by associated stimuli, gradually become interwoven into a unity of constantly active wishes. This *UNITY* responds to the mother's address of "you," or "John." The child begins to think of itself as "John," "he" or "you" won over the bad little boy, or spirit, or devil, which represents the socially indifferent, segmental wish. In this manner is slowly developed the "I," "Me," "Myself," and the "Not-I," "Not-Me," "Not-Myself." The asocial craving becomes the "devil's" influence in us. When the personality or organism acts as a unity with the hunger cravings, we say "I am hungry." When the individual wishes to do *something and hunger is disconcerting him*, he says "my hunger." The child, the savage and the dissociated personality often say of themselves "he is hungry" or "the stomach is hungry." The intelligent adult, upon experiencing a new, disagreeable gastric sensation which is functionally analogous to hunger, as a "burning pain," does not often say "I am burning" but says "my stomach is burning," or "I feel a burning sensation."

Gradually, in youth, this unity develops into the "good," "conscientious" *I* and the evil, uncontrollable *Not-I*. Many people are still inclined to differentiate this as the "soul" striving against the "flesh" or the "devil." In the chronic, functional deteriorations this mechanism dissociates and the individual interprets the *Not-I* as another personality. This mechanism is of the utmost importance to the insight of the psychopathologist and for all people who wish to relieve the suffering and anxiety that is caused by the eternal feud between the "I" and the "Not-I."

A man or woman may learn to know, with little difficulty, that all his anxiety is due to fear of failure to live at the level that pleases all his wishes best. This failure may be caused by a disease in an important organ or by an unmodifiable persistent affective need that we cannot or dare not permit to have gratified.

Before considering the mechanism of *repression* of individual cravings the physiological nature of the so-called *will* must be considered. The riddle of the nature and origin of the *will*, which has baffled philosophy and psychology since man began to assume its

existence, may be remarkably clarified for the student if he will follow the suggestion to see the *will to be* or the *will to have* as the *wish to be* or the *wish to have*.

The will is the compensatory affective or autonomic striving which, as a wish, protects the individual from the anticipation or fear of failure or losing the esteem of the object of his transference.

When we *will* to do this or that, or go here or there, we really allow ourselves to *wish without restraint*. This capacity is, or should be, assiduously cultivated by the individual throughout its life so as to become a consistent attitude toward everything in the environment. The affect craves for an event or an object and the likelihood of its not becoming a pleasing reality causes a *fear*-producing reaction in proportion to the seriousness of the wish and the likelihood of its not being gratified. The *fear* reaction, in turn, very quickly arouses a compensatory speeding up of the autonomic apparatus, as shown by Cannon and others, in the increased rate and strength of the heart beat, increase of adrenin and sugar in the blood, and an appropriate shift of the blood supply to the working parts. This compensatory increase of physiological power, greatly invigorating it, enables the wish to attack and reconstruct the environment so that within a certain time certain events must occur.

This mechanism works incessantly in every person's daily life in a ceaseless stream of minor events. When I wish a pencil I must compensate for the pencil's failure to place itself in my hand by picking it up, an aggressive act. When I need some one's assistance I must compensate for the discomforts caused by not having it by expending the energy which has been aroused by the inconveniences of the situation and seek it.

The man, who, after due consideration, allows himself to wish to have an object or an event, such as a position, factory, invention, be an honored guest, conduct a hazardous responsibility to a successful conclusion, make a scientist of himself, must not only be able to wish for the event but be able to successfully compensate for all the fears of failure that may arise. Just as his compensatory powers begin to fail the weakness of his so-called *will* becomes manifest. When we wish for an event but do not act to make its fulfillment possible, the wish is not strong enough to act. It is only strong enough to cause the thought of acting.

This compensatory physiological striving occurs reflexly and through the introspective analysis of the occasions of what would be called increased *will power* in myself I have been able to find a repressed banal fear of losing the thing I wished to acquire. For

example, while working on a manuscript my capacity to coördinate details and to visualize the object for which I was striving (demonstration of a theory) had greatly subsided and for several days I could get nothing done. Then one day about noon the capacity to work had become greatly accelerated. This acceleration had occurred so spontaneously that it was well under way before I realized that it had occurred. At first I could not account for it. No one had relieved any diffident, repressive tendencies in myself through an expression of esteem for my work, but, with further recall, I became aware of the fear that another psychopathologist, who was acquainted with my material and theory, was finding it difficult, revealed in his manner of saying what he would like to do, to refrain from usurping my rights. The only practical defense was being reflexly made through vigorous self-assertion which discouraged the other man. Within a few minutes the vigorous autonomic compensation for the fear of the possibility of losing the fulfillment of an important wish began to show itself in an aggressive onslaught upon the environment, my data, and making it conform itself to please the wish by assuming the form of a completed article.

The grand old law that "honesty is the best policy" has a critical significance in the development of personal power. It often requires the endurance of great anxiety to honestly consider the prospect of failure, particularly when a dishonest adaptation, as a lie, secret, or malicious advantage, may save the situation. But the enduring of the anxiety in turn gives the individual a sublime reward in that the autonomic apparatus is so constituted that the situation forces it to augment its vigor and thereby develop additional skill, endurance and power. One may see this compensatory mechanism wonderfully developed in such remarkable characters as Charles Darwin (51).

The failure to endure anxiety makes the vicious, secret intriguer, the behind-the-curtain-politician, the pathological liar, the drug habitué, the shyster, etc. Society can only protect itself from the destructive influences of such dishonest adjustments by resolutely, promptly, severely punishing every unlawful adjustment. Because, then, the greater fear will influence the individual to endure the lesser fear until the compensation is established. He then only can become a stronger link in the social chain providing he is given a fair chance to win social esteem.

The so-called paraphrenia types, that is, individuals who are "weak of will," fail to make socially approvable adjustments because of the poorly developed nature of the wish to be socially es-

teemed. This is due in turn to the nature of the conditioning of the love-cravings. The self-lover or autoerotic type naturally sacrifices society's interests in the innumerable petty crises as well as in the greater crisis, in the sense that he would rather dream about himself than work for the welfare of society. This is not his choice, but, during his growth, his parents failed to give him sincere love and esteem, without cost, during critical tests. The attitude of wishing to be esteemed was not developed sufficiently to endure the stresses of competition when a more self-reliant rival had to be beaten. Hence the timid retreat into autoeroticism where no rivals care to enter.

We may sum up then, the "*will-to-become*" is the same as the "*wish-for-esteem*" and the "*wish-to-have*." *It is the autonomic apparatus's reflex compensation to protect the wish from the possibility of failure to acquire gratification that gives us the power to endure and act.*

This now brings us logically to the significance and mechanism of the affective conflict between what may be designated as the *socialized* wishes of the personality, which constitute the "I," "Me," "Myself," "My Soul," "My Conscience," which are physiologically founded in the personality *acting as a unity*, and the perverse, segmental craving or wish that constitutes the Not-I or "evil" and arises from some individual autonomic segment as the digestive or sexual apparatus.

To illustrate: The hunger cravings in the stomach may, through their compulsive power, place the entire organism and its future in jeopardy by forcing the stealing of food. This has a much more common application in the commitment of sexual transgression, particularly when the compulsive craving for autoerotic, or perverse homosexual, or incestuous indulgence is persistently forcing itself upon the individual. This conflict of the integrative functions is the mechanism that causes the destructive psychoses and is to be found underlying every functional deterioration of the personality. Where the sexual cravings support the socialized wishes of the personality, the individual becomes virile, good and happy, and a most constructive social influence. It applies further in that when society becomes abnormal, the sexually normal attack society, as in the great social upheaval in France which overthrew a perverse aristocracy.

Out of the affective conflict between the *cravings of the organism as a unity* and the *cravings of a segment or part* for control of the final common motor path of adjustment, arises the mechanism of *suppression, repression, the summation of allied cravings, and the*

summation of the antagonistic cravings, dissociation of the personality and affective compensation with satisfaction giving compromises as sublimations.

Always, asocial, egocentric and pernicious tendencies must be repressed or denied in order to retain another individual's transference unless the object of the transference tolerates asocial and perverted indulgences.

The function of affective repression seems to have developed considerably later in the phylogenetic scale than affective restriction (32) and is to be observed later in the life of the modern child. It probably does not often occur in savages and is poorly developed in mental defectives and certain types of asocial adults.

The mechanism of affective repression is to be met with more or less in every personality in modern civilization. It is essentially the result of the personality becoming the host of an affective craving which, being utterly intolerable because of its disastrous consequences if allowed free play, is repressed by a vigorous fear reaction and soon followed by a compensatory striving. The social and moral exigencies absolutely require such an adjustment because the individual members of the herd must protect themselves from their predispositions to imitate.

In the phenomenon of repression, two factors are always apparent, (1) fundamental selfish or segmental cravings which are repressed, and (2) socialized altruistic cravings which repress them. The segmental cravings are usually repressed or censored when they tend to place themselves above the race to the detriment of society, as in unjustifiable loves, perversions, hatreds, autoeroticism, or avariciousness. The healthful resolution of the conflict occurs when the segmental cravings require that which will further the best constructive interests of the individual and society.

Almost every imaginable variation in the intensity and firmness of the segmental and the socialized affective cravings may exist. No two individuals are alike, although the mechanisms are essentially the same.

Obviously enough, in modern society, the one persistent affective craving which is more or less constantly censored is the sexual, since society must protect itself from excessive sexual indulgence because it leads to a pernicious waste of energy. Civilization and the race would deteriorate. On the other hand, sexual interests may become so excessively repressed that civilization must become a burden. This is not strange, but is a universal biological result

that occurs with excessive indulgence in, or undue denial of, any of the necessities.²

The affections, which should tend to a refined, honest, sexual expression in the adult, may become perversely conditioned in the infancy or youth of the personality, and, when the cravings to acquire social approval are developed, the individual's eyes may be opened to his plight. Horror, shame and anxiety may be the result. For example, a too devoted, pretty mother loved to bathe her infant son. This arrangement continued happily until he was about twelve. The situation was innocent enough until one day some of his boy playmates, who had no little insight into sexuality, learned of it through an innocent remark. Their surprise, scorn and sexual impressions opened the youth's eyes. That night the boy absolutely refused to be seen by his unwise mother. Foolishly she persisted and almost worked up a catastrophe, but no commands or persuasion could change the boy's horror for the arrangement.

In psychopathology one finds that many people suffer because their sexual affections are conditioned to react to an *unattainable* object such as, either (1) a socially tabooed object like the father, mother, sister, brother, or a perverted or homosexual object; or (2) a lost, or unresponsive, or degraded love object.

On the other hand the sexual affections may be apparently normal in their reactions and requirements but the socialized cravings may be so rigorously repressive of all tendencies pertaining to sexuality that the individual may suffer from chronic anxiety. A pathologically conscientious woman, who apparently was trained to believe that anything pertaining to sex was horrible and the cause of the sorrows of humanity taught her children this belief. All her children, when they matured and the reproductive forces began to make themselves felt, became psychopaths. The man, a son, who gave this information in order to have his brother saved from a serious state of sexual anxiety, frankly included an account of his own sufferings and insanity because of his inability to reconcile the impressions of his mother's life-long teachings and his sexual affections. A healthful solution for himself came with the gradual revision of his moral feelings.

Such pathological conditions do not require sexual license. On the contrary, as a fundamental social necessity, the conditioning of

² Sexuality is here used in the sense that love is usually used. Sexual intercourse is not normal unless accompanied with love. Even among students of human behavior the *necessity* of love in the sexual functions of the individual is just becoming generally recognized.

the sexual affections, to react to, and require, such objects that their seeking shall bring a healthful affective freedom, efficiency, honesty, happiness and virility, is required.

When affective cravings urge an old man or a boy to run home in order to deposit something and then hurry him back to the street corner to see the circus parade, we have an instance of conflict. In such processes, which occupy most of our daily behavior, conflict occurs as the various affective processes strive to control the final common motor paths of adjustment. Under such conditions, however, affective repression does not occur. The individual is not forced by the situation to repress or make himself "forget" any of the yearnings. He freely entertains them as they arise, and, in due course of events, they are permitted to attain gratification. *Repressions are made at a critical moment and occur reflexly and not after consideration.* Giving the affect consideration is almost the opposite of repressing it. The individual, like the proverbial ostrich that buries its head in the sand, represses the affect in order to forget or escape being made aware of it. The repression of the primary affective functions, it seems, is always pathological. Any form of affective craving may be repressed, such as love, fear, disgust, shame, anger. One may imagine an infection that led to health and fortune and so with an affective repression, but, as a general principle, the repressed craving causes severe functional disturbances in the stream of thought. This becomes manifested when the individual attempts to adapt his wishes to unpleasant interests and finds in himself an unexpected resistance or aversion. He feels a tendency to make mistakes, to show unexpected preferences and aversions, forgetfulness, insomnia, loss of spontaneity and inspiration, feelings of weakness, headache, "queer thoughts," obsessions, mannerisms, fancies, change in style of writing or drawing, speaking, laughing or singing, etc. The repression does not always indicate a personal weakness. A serious repression may be made from dire necessity, and, if anything, indicate unusual self-control.

A young naval officer, who had incurred the animosity of his superior, was repeatedly enraged by the latter's humiliating nagging on board ship. The situation required repeated repression of the anger and indignation, since escape and retribution were impossible, because of the peculiar nature of his personality and of other circumstances. This finally produced a state of utter inefficiency in the man, including loss of weight, insomnia, depression, forgetfulness, etc.

A young woman was persistently dominated in a most irritating

manner by her husband's mother. The family arrangement was such that a frank conflict, which would surely have been violent, had to be avoided by the young woman. A series of repressions of hatred and shame finally produced a grave psychopathic state (15) with eight independent symptom complexes.

Affective repressions may be made after a long struggle, and the affect may disappear, it seems, without one's realization of it. An obsessive thought or feeling may be irrepressible for days, and we may complain to our friends of not being able to get rid of it. Some time later, we may be asked about the obsession, and, for the first time, we realize that it is gone (assimilated or repressed). The repression was made without awareness of its occurrence. *In every instance of repression, the personality makes an intensive affective coördination along compromising lines of adjustment, which really become the resultant or final common path of adjustment between the repressing and the repressed cravings.* We may substitute compromising vocations, hobbies, sports, artistic and intellectual interests, charities, religious sects, rituals, societies, in fact, anything, in order to forget the painful love memories; that is to escape being made aware of the needs of the painful affect.

A child may be delighted by anal erotic, masturbatory, sadistic, masochistic or exhibitionistic play, thievery, a mannerism, perversion, or the death of someone, and, later, upon its realization that the wish for such things is an indication of degeneracy or inferiority, a repression of it may be effected after an anxious struggle. In the desperate effort to escape from any reminder of the difficulty, the individual goes in almost the opposite direction. Unconsciously, he strives to get as far away from it as possible. *The compensatory trend may gradually become the dominating characteristic of the personality during maturity, depending upon the vigor of the repressed affect, and the persistence necessary to keep it repressed.*

A child that is delighted by enuresis, excreta, odors, filth, waste or slovenliness usually is later horrified by the significance of such pleasures, and, compensating with a phobia for everything that suggests a return of the old cravings, becomes painfully clean and scrupulous.

The anal erotic psychopath is notoriously stingy, systematic, and has a horror for dirt. When he yields to his cravings, he becomes extremely slovenly and filthy. The extravagant, licentious Augustine, when he saved himself, became a saint of self-denial and holiness. The epileptic, heathen Paul became a saintly teacher of Christianity, justice and equity.

The repressed affect is *conditioned* to react to the presence of the stimuli that previously generated it before the repression occurred, and, in this sense, a *fixation* of its functions is established. If love or anger for an individual is repressed, the presence of this individual, or one with associated attributes, causes uncomfortable autonomic reactions despite all resolutions to prevent it. The defense is usually to avoid the stimulus. In adults we rarely see a compromise or congenial readjustment after a quarrel in which both sides failed to get satisfaction, which is due to a fixation of the resentment. A young woman remarked that when she got a new position she would tell her "autocratic" boss what she thought of him. The new position would remove the repressive fear and the anger might then enjoy free play. The comment itself was the result of allowing the inhibited affect some freedom, which the influence of sympathetic friends made possible through removal of the inhibiting fear of appearing petulant.

Freud (33, 34) has shown that the repressed affect is constantly trying to break through the resistance and manifests itself in motor incoordinations, that is in the innumerable little mistakes of speech, writing, forgetting, substituting, misspelling, etc. When the repressed affect succeeds in breaking through the resistance in the disguise of wit, the feelings of potency produced are a great pleasure and we laugh. This occurs when we are repressing an affective interest unduly or when the presence of someone is the repressing influence.

The repression is always the result of a form of impotence, lack of skill, power or courage, often because of a long-established timidity through the domineering influence of a parent, but more frequently because of the peculiar situation involved and the vulnerable physiological state of the individual at the time of the crisis, as in exhaustion, convalescence, etc. *Wit* disarms the aggressor by a spontaneous, subtle, ingenious stroke of words and the old feeling of potency returns. It always makes us chuckle. The witty remark may be made by another at the aggressor's expense but all who laugh are enjoying the release of their own repressions, if not toward that particular individual then toward an identifiable likeness, or situation.

Humor is an attack of benign ridicule directed upon the difficult things in life which we cannot comfortably master, and is administered to soothe an irritation. In the humorous phrase or caricature is often a revelation of one's previous deficiency. The caricatures

of Mutt and Jeff, Happy Hooligan, Hans and Fritz, the mighty Katinka, etc., must certainly give the authors a delightful vehicle for avenging an ancient grievance. Mark Twain is said to have written as a humorist in a serious attempt to teach a philosophy of living. We laugh, spontaneously, with unrestrained pleasure, when we become aware that a *restrictive influence* has been *spontaneously* subjected to an utterly heedless humiliation. Some one in a group of men described a large, stern suffragette with an ugly temper getting hit on the head by a tomato during the badgering of a militant suffrage parade. Everybody laughed, surely, because the description of the oppressive Amazon caused a faint discomfort, and her sudden humiliation permitted an affective readjustment.

The struggle for social supremacy is so universal and continuous among men and women that pleasurable feelings are produced by every situation, no matter how insignificant, that reflects directly or indirectly upon us a sense of superiority or relatively greater potency than usual. We seem to be prone to smile at all sorts of mistakes, failures, clumsy movements, errors, signs of weakness among our associates. Fortunately, our own strivings, when they are crude, become amusing, and the energetic economy in this is apparent when the "saving sense of humor" is compared to the waste of energy attending chronic anger and worry at our own mistakes.

An eccentrically developed tendency to enjoy the failures of others is symptomatic of relief from strivings to be superior and indicates a subconscious sense of inferiority. We find such symptoms in people who suffered from humiliating inferiorities in childhood, such as bed-wetting, awkwardness, ugliness, etc. The seizure of little opportunities to display knowledge, such as looking for opportunities to make corrections, are also symptomatic of subconscious feelings of inferiority. One often notes the use of pretensions in order to hide a secret which has been more or less inhibited from consciousness.

The metropolitan newspapers rarely miss an opportunity to socially submerge unfortunates by publishing broadcast their scandals, because the upward-striving, common herd delight in reading about the downfall and failure of others. Rarely indeed are successes featured in a paper, unless they involve a direct advantage to the average reader. On the other hand, social degradations which have no direct relation to the average individual are given blazing headlines.

Summation and Reënforcement, and Reciprocal Inhibition of Affective Cravings

Often, "a lot of things" or "several reasons" is the explanation given for doing something or making a change of position or habitat when any one of several wishes may not be strong enough to cause a change. Sherrington demonstrated that a summation of subliminal afferent impulses, when associated with an appropriate postural tension, will finally produce a reaction in the efferent neurone; also, a summation of cravings from a series of postural tensions may occur and produce overt adjustments, as when one is wearing tight clothing and must maintain a cramped, dignified position during an austere ceremony. Furthermore, Sherrington demonstrated the reciprocal inhibition of the negative or antagonistic afferent impulse, and it is probable that reciprocal inhibition of the negative or antagonistic wish occurs in a similar manner.

Various wishes may urge the same journey, as anger at something in the environment which we can punish by going away, ennui because of other things, love for some one, and a business wish may finally decide the going. The summation of a series of "petty annoyances" (anger reactions) may cause a change of employment. When the desire to go "there" is reënforced by a desire to leave "here" a change of position occurs.

In order to act, the negative wish *not to act* must be inhibited like the reciprocal inhibition of the negative impulse, which Sherrington says is just as important but more difficult to see (1, p. 178). For example, one may desire to be in the city, but will not go because he has no desire to leave the country, or one may wish to leave the country, but will not go because he can't think of any place desirable to go to. One does not go from "here" to "there" unless one wishes to leave "here" and wishes to go "there." The wish to go "there" may be very prominent in consciousness, and the reciprocal wish to leave "here" may be active subconsciously. The same mechanism would hold for selecting "this" instead of "that."

Summation and reënforcement may also occur in the repressed affections. This is indicated by the analytic studies of dissociations of the personality which have shown that disastrous dissociations of the personality may develop as the repressed affections accumulate and become too strong to be controlled.

Repression of a wish implies a *fear* of its consequences if it is allowed to work, but few people have the courage to admit that they

have been weak enough to repress a desire or impulse. One finds people who stoutly maintain that they "never" repress anything but (courageously by implication,) say "right out" what they think. Experience with such claimants indicates that they have no insight, and are often chronic "brooders" (repressors) with eccentric resistances, and only make the outburst upon an adequate summation (provocation) of repressed wishes. When we become aware, because of repeated irritations, that a summation of affect to retaliate is occurring within us, we are inclined to become disagreeably preoccupied with the dilemma until we find an acceptable means for retaliation. It is not uncommon to see highly trained men refrain from making an important expression of opinion, because they are afraid the accumulated affect may cause a momentary loss of self-control and something might be impulsively said or done that would later be undesirable, because it revealed the "bearing of malice."

Affective Conflict and Dissociation of the Personality

The concept of dissociation of the personality had its most definite formulation, though not its origin, in Bleuler's (44) studies of schizophrenia. When intense, enduring cravings or wishes oppose one another they seem to struggle for control of the final common motor paths just as two afferent neurones or two opposed individuals might struggle for an effector or a mechanical means to an end. The socialized interests of the personality, through incessant training, control the more self-indulgent affective cravings without much difficulty so long as both interests are fairly well satisfied by the compromise. However, when the sexual cravings or other powerful affective reactions such as fear, anger, shame, are repressed, because their tendencies are intolerable in a given situation, temporary dissociation of the functions is likely to occur as the socialized interests become fatigued, depressed or distracted, which will be shown in errors, forgetting, and persistent, undesirable thoughts. In the hallucination, say auditory, the repressed, dissociated wishes that arouse the auditory image are not recognizable as belonging to the ego or socialized self and are treated as a foreign influence or the work of another personality. In this sense a state of schizophrenia, or dissociation of the personality, occurs. In the normal individual, except during sleep, the wish produces a degree of awareness of itself, causing a sense of ownership and the question as to whether or not it is a part of oneself does not usually arise. This is in striking contradistinction to the repressed wish which is unable to

produce a recognizable awareness of itself but must reach consciousness through some symbol or disguise.

The persistence and semi-independent nature of the repressed wish was not given its due importance until the psychopathologist Freud (33) demonstrated that a *repressed* wish caused mistakes in thought and expression and proved to be the origin of hallucinations.

The inhibited or repressed wish often plays a trick on the repressing wish by substituting its own fulfillment through a slight change in expression. For example, when one writes a manuscript and upon reading it over finds that a neat little change in the meaning of an important sentence has been unconsciously made by the substitution of a letter in a word. Upon reading over a letter that I had written I found the word *spell* instead of *smell*, having unconsciously substituted the letter *p* for *m*. The word *spell* was an embarrassing revelation of a concealed wish to say something about spelling a name. Such incoordinations are forms of dissociation because the effort to produce a thing correctly is dissociated sufficiently to permit the injection of another expression. Dissociations of the error type will show, if analyzed, a wish fulfillment in the error.

The repressed wish, when it becomes dissociated or is out of control and independently seeks gratification through the compulsion, delusion or hallucination, becomes fixed in its conditioned requirements and tends to remain so for life. One highly intelligent, old paranoid gentleman has a history of having the same auditory, visual and tactile hallucinations for over fifty years. In the so-called dementia præcox cases (chronic dissociations) this is very common.

Failure to inhibit the negative or antagonistic wishes always produces incoordinations of thought or movement which may be correlated with Sherrington's principle that the entire nervous system is evolved on the mechanism of coördination of allied impulses and incoördination of antagonistic impulses. The psychoanalyst has been able to demonstrate that this same mechanistic principle holds true on a greater, more complicated scale in the functions of the affective cravings. Analytical studies of psychopaths, as well as normals, have repeatedly shown that apparently all conceivable degrees of affective conflict occur, ranging from the unconscious error, to serious, acute dissociations (35), to the grave, unadjustable, chronic dissociations of the personality.

The law that the autonomic or affective unrest tends to compel the acquisition of adequate stimuli, having the capacity of producing

a state of affective rest, holds true also for the affective cravings that have become dissociated from the ego (socialized wishes of the personality). When we are hungry we become aware of visual, olfactory, gustatory, kinesthetic and perhaps auditory images of past sensations acquired from previous attempts to get food. This awareness of the sensory images of getting food is a manifestation that the autonomic craving is already on its way to acquire food. Our thinking about where we will eat and what the dinner shall consist of is only the further progress of the affect on its journey, and the seeking and eating of the food completes it. When we mistake a stranger for someone, the misidentification is due to the adulteration of the actual visual sensations made by the physical attributes of the stranger, with images of past visual impressions made by the person for whom we have strong affective reactions. The awareness of the old visual images is produced by the restless affect which, in order to attain its object, like the food hunger, utilized semi-adequate sensory images until the reality could be obtained.

In the dream the same mechanism occurs and determines the dream imagery as was first demonstrated by Freud (19)—wish fulfillment or affective gratification.

In the delusion and the hallucination (35) the same affective mechanism occurs and the difference exists only in the degree of *vividness*, *persistence*, and *quantity* of the sensory images associated with the actual sensation produced by the exogenous stimuli at the moment. Because of the *persistence* and *vividness* of the sensory image (endogenous stimulus) the individual cannot differentiate its reality from a new sensation (exogenous stimulus). When one looks at the door and the door as a visual stimulus forces an awareness of itself despite all resistance or indifference it has certain essential attributes of exogenous reality. If the door seems to move and the visual afterimage of the moving door (hallucination) is as vivid and persistent as the actual, stationary door, the personality has no means of differentiating it from the exogenous stimulus, and an affective craving is the cause of the visual adulteration. We are expecting some one. A protest may be made here, namely, that we may be so engaged that for some one to enter the room would be most undesirable, so how can there be a wish fulfillment in the hallucination of the moving door? The answer must call attention to the negative side of the affective craving "to be alone by all means." The affective reactions have preceded the possibility of being taken unawares by preparing a defense so that if some one should come the organism would not be caught unawares. Since

all anticipatory states are states of unrest, usually more or less painful, the defensive affective reaction which had been restrained was unconsciously allowed to break through because its striving for adjustment had caused too much discomfort. Hence the door is seen to move as the restricted but aggressive affect gets into action. The anxious hunter often shoots wildly just in order to be shooting for relief from his tension. This mechanism is the greatest defect of raw troops because the agony from withholding the affect to counter charge becomes so great that they break and rush into danger rather than endure the anxiety. The defensive counter-charging affect finally breaks through and compels the assault, hence, like the hallucinated swing of the door, almost any situation is seized by the inhibited affect as an opportunity to make a comfortable readjustment, and "have it over with."

Complete affective dissociation occurs when the repressed affect becomes vigorous enough to break through the resistance while the individual is not aware that it is doing so. The socialized personality or ego cannot at any price accept the existence of the horrible, dissociated affect as a part of its personal makeup. This is extremely common in men and women who suffer intense agonies of fear from a persistent, uncontrollable craving for sexual perversions. In homosexual men, who would commit suicide rather than accept the tendency to sexual perverseness and yet who love the world, we often see the tendency of the growing sexual cravings breaking through the resistance in dreams—night terrors—and gradually, as the defense becomes exhausted, hallucinations of homosexual advances and finally of assault occur. Often such men make desperate counter-attacks upon all sexuality by fostering vigorous social-sexual reforms. In every hallucination for the existence of which I have been able to work out a reasonable explanation, a repressed (forgotten), intense affective craving was found to determine it. The exhaustion of the capacity to control the autonomic forces of the personality is in no sense dissimilar to that of a student who, after intense efforts to coördinate his interests in study in a distracting situation, becomes fatigued and must finally yield to the distractions.

The dissociated affect may become so persistently active that the awareness of the sensory images it produces may be treated by the individual like mental impressions caused by the suggestions of another personality. In such cases an intricate, elaborate, compensatory defense (perhaps self-aggrandizing) and an angry counter-attack is often developed. One may see such individuals in any

asylum, charging a friend or relative or fictitious personality with being the cause of sensory disturbances which are often obviously wish-fulfilling.

It often happens that the repressed affect does not become dissociated or assert its independence until disease, intoxication, or exhaustion weakens the controlling affective strivings. The repressed affect, like the antagonistic afferent impulse, is controlled by preventing it from dominating the final common efferent paths which it must use to acquire gratification.

In the psychogenic dementias or chronic dissociated states the dissociated perverse affective cravings act on the principle of acquiring gratification just as the well-conditioned affective cravings, seeking gratification, develop a personality with mighty powers and sublime accomplishments. The degree of affective dissociation may often be measured by the degree of social disorientation.

The dissociation of the affective forces of the personality may be correlated with independent conflicting functions of various divisions of the autonomic apparatus. Concrete proof that such things occur is furnished by undesirable sexual cravings, incontinence of feces and urine, vomiting, glandular secretions in the presence of certain stimuli, or the tendency to do opposite things at the same time when in panic states. In many psychoses it seems that part of the organic unity strives to coördinate itself to work along certain lines (socially laudable), and a reactionary division of the organism persists in going in another (conditioned) direction which is horrifying.

That different divisions of the autonomic apparatus may oppose one another is now accepted by physiologists and given much emphasis by Cannon (4), who finds indications that the sympathetic autonomic division opposes the cranial and sacral autonomic where a dual innervation of visceral muscles occurs.

In seasickness strong swallowing and gulping reflexes start esophageal peristaltic waves downward in opposition to nauseating, retching, emissive, peristaltic waves coming upward from the stomach.

Individuals who are predisposed to affective dissociation are usually characterized by tendencies to brood, be irritable and eccentric. They belong to the "shut-in" type because they have chronic tendencies to inhibit or conceal their affections. Fear of permitting the affect free play, such as in curiosity, friendliness, love seeking, prevents it from attaining practical contact with reality and the environment, and forces it to use endogenous forms of counter-stimulation, as day-dreams, imaginations, hallucinations, etc.

In this sense the personality becomes *introverted* in type. The *extroverted* type of affective adjustment is quite the opposite and contact with reality is its consistent characteristic. Jung (37) and White (38) have strongly emphasized the importance in psychopathology of *extroversion* and *introversion* of the affective strivings.

A compromise of extroversion and introversion tendencies is the mechanism normally used in everyday life with the extroversion tendency always slightly dominating the introversion tendencies. Modern American society inclines to be organized on the basis of individual equality and when an individual tends to either excessive affective extroversion or introversion he becomes eccentrically bold and inconsiderate or too timid to support the social system. The whole civilized world reacted to destroy the excessively domineering extroversion characteristics of the Teutonic peoples which have been assiduously cultivated for a series of generations under the guise of "will-to-power" through the means of an oligarchical militarism. We must "make the world safe for democracy" is the affective reaction. The affect may be so shut-in and qualified with feelings of self-blame that anger may attack the organism itself. This always occurs when the stimulus of the anger originates within the organism as in a stupid error, carelessness, indolence, or autoeroticism. One may observe individuals "cussing themselves out" for laziness after missing an opportunity; similarly the self-castration of masturbators.

The extroversion mechanism is essentially healthful and conducive to robustness, because the autonomic disturbance is more promptly neutralized; whereas the introversion mechanism tends to a prolonged increase of affective sensitiveness. With introversion a lowering of the threshold of the autonomic reactions occurs so that ordinary, subliminal stimuli may cause vigorous, autonomic reactions which are usually distressing. Painful consciousness of self results and this may become so chronic as to become an enduring characteristic of the personality. Self-conscious personalities are notoriously irritable and unstable in crises. The self-consciousness of psychopaths is well known and is probably due to heightened postural tensions in the autonomic apparatus. *It is absolutely vital for a happy maturity that youth shall master the causes of self-consciousness.*

The biological principles of atrophy of structure through *disuse* and the specialization of function and crystallization of structure through *use* give particular significance to the recent physiological conception, that the skeletal striped muscle is fundamentally

an unstriped cell in which is embodied a striped or projicient motor apparatus (an evolution of the skeletal muscle to enable the autonomic apparatus to fulfill its biological career). This indicates the intimate nature of the fundamental need of the reactions of the autonomic or affective sensori-motor system for the prompt spontaneous usage of the skeletal striped muscle. Therefore, when an affective disturbance occurs and an outward appearance of indifference is maintained, the affect is "shut in" and so-called affective introversion may occur. The boy or girl who, because of teasing (repressive influences), is too timid to risk the crude mistakes of adolescence, tends to remain autoerotic, and his or her affections become introverted, *i. e.*, dependent upon endogenous sources (fancy) for gratification.

An affective repression in a crisis may so seriously inhibit or retard the spontaneity of affective response and expression in future situations that the very essence of living becomes lost through impotence. We find innumerable people who are utterly unable to respond to a situation until the safety of a prospective course of action is completely assured. This vital lack of initiative must be as fatal to any career as headlong impulsiveness—and is as radical. Such people are characterized by chronic capacities for retrospective thinking about "what they might have, or should have done." The timid individual may tend to a persistent chronic hatred of the causes of his failure. This anger may be directed, self-consciously, at his deficiency, timidity, cowardice, self-love, or projected upon some innocent critic or aggressor. Anger for a deficiency seems to be a valuable mechanism for overcoming it if the deficiency is not too firmly established. This is a common mechanism adolescents use to break up masturbation cravings. Brooding is a symptom of the introversion tendency when imbued with anger. Then the affect is not permitted free play, is not assimilated, and tends to punish the self. The smoldering self-hatred may reach such bounds that the individual may mutilate himself physically, socially or morally. This tendency is found in a queer group of alcoholics who are virtually compelled to "fight booze" and drink themselves to death. In some cases of dementia where the personality tends to destroy itself through masturbation, self-mutilation, or castration, this self-hatred appears. A young dipsomaniac, whose chief pleasure in life seemed to lie in keeping himself in a drunken stupor, remarked during his psychosis, when he tried to eat the dirt on the floor, "I thought I ate all the dirt in the world." We see this self-hatred mechanism most highly specialized in the wretched, poverty-stricken dipso-

maniac who smiles as if he were a hero when, with his belly against the bar, a certain type of patronizing individual praises him as a "booze fighter." The significance of "fight booze" is recognizable in the hatred for all constructive interests in life. Introverted anger like extroverted anger tends to destroy its cause. Such men are usually doomed to self-destruction if the cause of the introverted hatred is chronic. A flirtatious mate may arouse a grave, smouldering hatred, and long-established repressive habits may permit of no other solution than the alcoholic's method of getting indirect revenge. Occasionally one meets with middle-aged men who have become vicious alcoholics without apparent cause. An analysis of the situation may show jealousy of the wife, who is openly demonstrating her preference for her maturing son. She parries the husband's angry thrusts so cleverly that he can get no satisfaction. After this affective dilemma has continued a year or so society is suddenly astonished to learn that the alcoholic husband, who has become a physical derelict, has destroyed all the resources of his family through whiskey debts. The introverted rage thus tends to obtain gratification by destroying its causes, *i. e.*, the home and the tactless self.

The tendency to affective introversion may become so excessively developed that the individual gradually loses practically all interest in the environment. The asylums contain many such individuals, who contribute no spontaneous effort to improving the environmental conditions. They are characteristically socially indifferent and spend their existence in a dream state. Their timid, retarded movements, meager, monosyllabic replies, total lack of spontaneity, and oblivious deliberateness, demonstrate the extreme degree of the autonomic indifference and the peculiar, almost unchangeable postural muscle tonus. They are easily recognized as they wander along, looking at nothing, arms hanging semi-rigidly at their sides. They never laugh out loud, except to themselves, their voices lack resonance and at best they respond to a humorous situation with a faint little smile. They make no friends. When such individuals strive to establish their social equality, they become irritable, unstable and inclined to incongruous, impulsive acts. Every spontaneous movement makes them extremely self-conscious, as if with astonishment at themselves. The introverted individual seems to be uncreative, in proportion to his introversion, whereas the extroverted manic is often ceaselessly creative. The Oriental is unimaginitive in a constructive sense, is not inventive and is relatively far more introverted than the European or American.

Affective Progression and Regression

If the adult will scan his affective career, he may note that, rather consistently, up to a certain age, at least, he felt a constant pressure to improve and refine his methods of fulfilling his wishes in order to attain in some endeavor socially preëminent potency. The law by which this tendency is seen to work is that the craving or wish strives to attain a maximum of gratification with a minimum expenditure of energy. Thereby occurs the extension of power. As a man refines himself and his instruments, he feels a decided *progression* in general efficiency and integration of thought. This tendency to perfection through practice, in manipulating the self as well as the environment, is also to be seen in animals (36). One must recognize that, in himself, each wish strives according to this law, and that with resignation to one craving, although this pleases it, the other more or less opposed affective cravings, being unable to realize themselves, cause discomfort, that is, a sense of waste or misuse of energy, hence shame and "pangs of conscience." Therefore, the tendency naturally develops to conduct oneself and select associates so that all of one's cherished wishes may freely influence one's behavior. Upon this mechanism is based the moral progress of honest men, as well as the degradation of thieves.

In many adults, after a critical failure, a tendency to affective *regression*, to a lower, easier level of less exacting requirements, is likely to occur. Apparently, this regression is a return to an affective adjustment that was previously satisfactory, and is usually far more vulgar, more heedless and infantile, and less satisfactory for winning social esteem. An observable degree of social indifference occurs with it. Extreme instances are particularly common in hebephrenic forms of dissociation of the personality. In such cases, the personality regresses to a heedless, self-indulgent, indolent, childhood level, where, with its enormous reserve of physical power, it easily gratifies its slothful, childish requirements with relatively careless incoördinated forms of thought. Affective regression essentially produces a disintegration of the higher integrations of function or thought, whereas affective progression requires the construction of more comprehensive and refined integrations of thought.

The tendency of the biological forces to constantly refine themselves so as to attain a maximum of result or satisfaction with a minimum expenditure of energy is not only to be seen in the organic structure and the curves of objective and subjective learning, as studied in the psychological laboratory, but we may see this principle demonstrated in the evolution of machinery, the automobile,

aëroplane, piano, factory, university, church, kitchen, soap. A delightful thrill is felt when we hear of some new invention or about something being done "for the first time." With it, we transcend our old ways, and feel a momentary respite from the resistances to our striving wishes.

The tendency of a particular affective craving or autonomic disposition to acquire neutralizing stimuli, which is characterized by a consistent pressure to gracefully economize in the expenditure of energy, may be observed in play as well as work. In play, where energy seems to be wasted with utter disregard, the freedom of movement healthfully counteracts the restrictive tendency of controlled movement which must occur during work. Play prevents a form of atrophy of disuse by increasing the elasticity of the adaptive functions as well as permitting the affect more freedom, and, more rapidly than work, rounds out the growth and skilfulness of the individual. One's endurance for work is greatly increased when work becomes play.

The attainment of satisfactory exogenous stimuli, which gives one a delightful sense of potency or power, is, perhaps, due to the excess of metabolic (adrenin) or energic products which were prepared for the work or struggle and still suffuse the system after the goal is won. This phenomenon holds true for any form of affective cravings so soon as the object becomes assured. With the assurance comes relief from a form of tension, a fear of not winning or retaining the object.

On the other hand, so long as the desired state or goal is not assured one feels an unpleasant sense of postural tenseness, and, when the object becomes hopelessly lost, or is unattainable, a sense of impotence or weakness is felt throughout the body. Such struggles against anxiety may become chronic, as when poverty or business disaster seems unavoidable. It is quite possible that the quantities of adrenin in the blood stream during the states of potency and impotence, above referred to, are equal but the fact that in the potent state the object is assured makes the quantity relatively excessive, whereas when the object is lost the struggle is not at once abandoned.

Every personality tends to develop certain individual interests in which it strives particularly to establish its potency and rather early becomes indifferent to most other interests. One may observe this in individuals as they strive to establish their potency as scientists, philosophers, pugilists, educators, bankers, beggars, cooks, surgeons, tailors, social lions and what not. Whatever the trend of a man's interest, one may observe that it is his vehicle for establishing his

biological potency. The individual cherishes his vocational or special interests with the same jealous care that characterizes the attitude of the bull moose with his mate.

Nothing so quickly destroys an individual's potency as any cause of fear. This probably has a physiological mechanism which is similar to the inhibitions of the digestive functions during fear states. Sexual impotence often results, in the physically well-constituted male, from a subtle form of fear which the individual himself is unable to master or understand. The fearful situation causes the blood supply to be conveyed into the head and organs of defense and forced out of the digestive system and sexual organs, causing impotence.

Affective Readjustment, Assimilation and Sublimation

When, through the psychoanalytic method, because of freedom from restraint, the repressed (forgotten) painful experience is recalled, a disturbance of the patient's behavior occurs. After the affect has been permitted to adjust itself, as in anger, by saying whatever the inclination requires, the patient often adds something about being relieved or "feeling better." Symptoms of functional derangements, as well as persistent thoughts, disappear and the individual gives many indications of having made an affective *readjustment* in which the hypertonic or hypotonic condition of some viscus, such as the bladder, stomach or vocal cords disappeared as the organ resumed its normal functions.

When an individual is offended and is prevented from making an adequate retaliation, he is disposed to use a sympathetic medium with whom he talks over the other fellow's offense and then feels relieved. For some time after the painful situation, if he failed to obtain "satisfaction," the restlessness and distractibility reveal his difficulty with the persistent affect. This tends to continue until the affective reaction is thoroughly submerged by a change of interests or gradually becomes assimilated.

When an affective reaction (such as anger) is aroused by an exogenous or an endogenous condition, one becomes aware of a compelling influence or motive to punish the offensive factor. The sensations it causes are often clearly recognizable as a fullness of the thorax with a tendency to expel the air forcibly, such as to shout, speak vehemently, or blow the breath out noisily when speech is suppressed. Also one feels a tumescence of the muscles of the arms and hands, a fullness in the neck and congestion of the face with distinct sensations of gripping and striking postures of the muscles.

The clenched fist and jaw and staring eye overtly signify the state of the postural tendency to punish or remove the offensive stimulus.

So long as the affect is inhibited from executing overt movements, an inhibiting or restraining affective force is at work in some form of fear. Few individuals have the frankness to admit that they are afraid to attack when angry, but insist they refrain on grounds of decorum, propriety, etc. This, however, implies a fear of violating social dignity. In some instances, upon "mature consideration" the offender may be held irresponsible or justified in his offense. An affective readjustment may then occur as the inhibitions of anger disappear, which is then, however, duly qualified by admissions that the offense was deserved. The aggressive tendency becomes directed upon the self, and satisfaction is derived through a self-punishment for the neglectfulness which angered the assailant. Such assimilation, in a sense, incapacitates us in that we are no longer able to become angry at an identical offense. This may constitute a personal deficiency or an excellent quality. We sigh (relief), go through distracting movements, and feel a gradual relaxation of the tense posture of the muscles as they readjust to their norm.

Another method of affective readjustment is to substitute an object associated with the offender and punish it, as his name, reputation, business. Wherever men are subordinated to one another in grades, as in armies, hospitals, factories, etc., one may trace an aggression as it passes down from a superintendent to an assistant, to an assistant's assistant, and so on.

With any type of adequate affective readjustment, the postural tensions of the visceral and skeletal muscles involved seem to relax and a state of affective calm recurs, as when we sigh our relief.

Whenever an affective readjustment is made to a situation, it seems that the reaction threshold of the particular affective reaction (as anger) returns to the normal, whereas, when the affective readjustment is not made, the reaction threshold is lowered and an ordinarily subliminal stimulus may arouse the autonomic or affective reaction. Since this mechanism is apparently true for all the affective reactions, it also explains how individual characteristics and variations toward the environment develop during the growth of the personality. We speak of such people as being irritable, sensitive, or "easy to kid."

The complex affective stream of the adult contains the conditioning influences of his past experiences, beginning with infancy. If one could make a cross section of the adult personality, towards

its center or infancy, one would find, like the imbedded fossils of the Pleistocene period (Jelliffe), the repressed and submerged but well-constituted affective cravings of infancy and childhood sustained in the infantile autonomic tensions. One may see in many adults the symptoms of childish affective retentions in the peculiar resonance and pitch of voice, the style of the words used, the bodily mannerisms, and particularly the adjustment mechanism to stressful situations which are strong enough to scatter the coördinations cultivated for social propriety. *That we devote most of the excess energy of maturity to working out the wishes of childhood* has been amply demonstrated by psychoanalysis.

The most consistently potent affective craving, in its influence upon behavior and the growth of the personality in modern civilization, is *love*. Upon the conditioning of a man's or woman's love cravings depends his entire career. Popularly, love is said to give or be given as if something passes out from the lover to the love object. This is an absurdity. What obviously does occur when the autonomic functions of love are freely active is an enormous pleasurable expenditure of energy through a reflexly sustained, invigorated postural tonus of the skeletal and visceral musculature, which in turn makes the love-object comfortable and inclined to reciprocate. "Love lightens labor" in that receiving the demonstrations of it the struggle for esteem need not to be so severe. Also there occurs an increased capacity for varying spontaneous movements which seem to be characteristically fashioned to cherish the love-object and induce a reciprocal demonstration of affection.

The loss of the love-object may occur in a variety of ways, all, in a sense, involving its destruction as a love-object, as death, disgrace, unresponsiveness, etc. In wretched young people, who are suffering anxiety because of the unresponsiveness of the love-object, it is not uncommon for them to seek for defects, physical or moral, in the love-object, in order to free themselves from the tremendous affective influence of the love-object to which they have become veritable slaves. Rival lovers in romance (author's fancies) often tarnish the love-object's reputation in order that the affective reactions can no longer be aroused by the one-time ideal. The heroic lover is always made to resent this effort to mingle disgust with love.

When the love-object is unattainable in fancy as a deferred gratification, that is, *when hope is gone*, the vigorous affective exuberance and the potent tumescence of the muscular systems literally shrinks, producing a depression, perhaps anxiety, psycho-

motor retardation and visceral pain. Ambition, cheerfulness, optimism, vigor, excellent digestive functions, refreshing sleep, efficiency, courage, spontaneity, as symptoms of the successful pursuit of the love-object become changed to depression of the neuro-muscular and gastro-intestinal functions, with insomnia, frightful, unfinished dreams, restlessness, incoördinated, retarded movements, seclusiveness, anxiety and despair. This general depression of the autonomic activities seems to continue until another love-object is substituted. In proportion to its suitability, an exuberant affective readjustment occurs. Most mature males and females, that is, all who lack inspiration, finally have accepted a substitution for their love-object. According to the ancient Greeks, when Cupid (love) flies away, Psyche (mental integrity) dies. In this sense, perhaps half of the matings are disastrous.

When the affective cravings of love are repressed through pride or fear, tremendous changes in the personality immediately occur which may endure throughout life, and the effects of the repression are to be seen in the deranged autonomic functions, as chronic sleeplessness, due to the lowered reaction threshold of autonomic tensions, irritability, gastro-intestinal distress, sexual impotence, etc.

Proportionately as the substituted love-object has attributes that gratify the *conditioned* nature of the love cravings, the restoration to a healthful, comfortable autonomic status recurs. A self-cure is often effected in the following manner. The anxious lover may devote his life to working for the fulfillment of the love-object's wish or yearning as he conceived it to be. This may be a work of art, a business or a social reform, an invention, a book, an exploration, a song, or crime, etc. The nature of the substituted love-object may be beneficial or injurious to civilization and the individual. The substitution for the love-object, of something associated with the love-object, is often called *sublimation* of the affect. Upon a successful sublimation depends the successful cure of the psychopath. The tendency to sublimation is usually characterized by efforts to acquire a finer object when anger complicates the love yearnings, as in Washington Irving's delightful Ichabod Crane.

The substituted love-object may be an attribute of the individual himself, as in the regression to narcissistic love of his own hair, eyes, hands, voice, demonstrating intellectual powers, as capacity for mathematics; or the substitution may be an impersonal object, as art, science, religion or philosophy for its own development. Substitutions vary in their protective value for preventing a recurrence

of the affective disappointment, and, further, though successful during part of a career they may fail later on.

Certain forms of compensatory striving should also be considered as forms of affective sublimation. The anal erotic child may become *eccentrically* fond of perfumes or colors when he matures. Children who are delighted by cruelty and suffering may, as adults, preach generosity and pity for criminals. The sexually impotent male may become a great inventor (creator), which is a very common compensatory trend of the semi-impotent.

A most important force in the development and refinement of the personality is the art of suitably withholding or restraining the gratification of a wish or craving as well as cultivating its genesis. By restricting certain wishes, the personality retains a dynamic urge which may be so directed that more difficult work may be accomplished than if the wish is permitted an early freedom and the pressure of the additional craving is lost. One may see this demonstrated by individuals when they have a keen desire to tell or do something, and, after having once accomplished the act, a repetition becomes labor. When the dog is hungry, he is a keener hunter. Many great producers of fine things owe their inspirations to some associate who was inaccessible but inspiring.

When the post-adolescent loves, he plainly shows a consistent urge to develop and demonstrate excellent personal qualities and perform creative work—as biological demonstrations of heroic potency.

Occasionally work drags, not from fatigue, but from the need of a wish that will speed things up. Then, quite unexpectedly, one finds himself entertaining a vigorous urge to undertake or finish a piece of work. Under such conditions in myself, I have been able to find the source, after a little retrospection, usually in *fear* of losing an object, although I did not recognize the fear reaction at the time of its onset. Only the compensatory urge to get busy was recognized until a self-analysis was made.

The man who refrains from accepting substitutions for the needs of his wishes usually has an excess of ungratified wishes that are displayed in his energetic seeking. Most people who lack power and energy have never learned to conserve their wishes or energetic resources. They either suppress them or waste them on substitutions. It seems that when the wish is controlled but allowed to assert itself a tendency to refine the means results, as in the selection of words to best fit a subject and the audience.

Affective Coördination and Reënforcement—Acquisitive and Avertive Capacities of the Personality

Upon the nature of the conditioning of the affective or autonomic cravings, it has been shown, depends the personality's development of *virility*, *goodness* and *happiness*. The conditioned affective reactions are the brick and mortar out of which the architecture of the personality is constructed. When they are so conditioned in infancy and youth that their acquisitive and avertive strivings in maturity are conducive to virility, goodness and happiness the world says "there goes a man." Though it takes at least three generations to make a man, every succeeding generation must sustain its own manhood through work or surely the individual, the family, and the race must regress to a lower phylogenetic level through atrophy of disuse.

Obviously the strong man is he who is relatively free from conflicting affective cravings—whose primary affections are so conditioned that their energies reënforce each other in their strivings to mould the earth to the desire—whose minor affective repressions are such that the reflex compensatory strivings fit him truly into his social group. Then he becomes a potent, constructive member of society. Upon the conditioning of the avertive and acquisitive needs of the affective cravings in infancy are superimposed the conditionings in childhood, in adolescence, and in maturity, as the personality grows through its biological stages.

A scattering of the needs of wishes or cravings retards specialization of function, but excessive specialization produces atrophy of disuse of other, perhaps vital, personal or social interests. Work is felt as play so long as the personality must not strive to keep repressed a contradictory, inharmonious craving particularly of a primary nature, such as hatred, sorrow, shame, fear, or love. The suppressed, one-sided life of a Fabre, though its specialized strivings have the stamp of genius, can only be an inspiration to those who are affectively similarly constituted.

The affective urge to talk will talk even though the tongue and throat be swollen and ulcerated by cancer. Affective aversions for talking will prevent talking although the vocal cords are anatomically perfect. Excuses (reasons) need only be found to justify the free play or restriction of the wish. The tendency to over utilize or depress the function of a particular organ, for which the affections are conditioned to have acquisitive or avertive tendencies, may cause the hypertrophy or destruction of the biological potency of the organ and even the individual, as the child deforming its face

by pulling its nose to the right or by sucking its finger, or, in the oral erotic cutting his throat or refusing to eat. This principle of affective striving also determines the selection of vocational interest and the acquisition of particular kinds of knowledge. The compensatory strivings that endure consistently for years in order to cover an organ inferiority, or another affective inferiority, are to be found in every personality. The stuttering youth Demosthenes became an orator. The child that had a retarded speech development in infancy often becomes a linguist.

The avertive tendencies not only retard the acquisition of knowledge or skill but they in themselves constitute an enormous quotient of the energetic capacities of the individual which may be turned in the opposite, asocial direction. It reminds one of the result when a regiment surrenders its guns and ammunition to the enemy. An individual becomes a dullard when parents, collegiate, social, or business obligations compel him to acquire the necessities of life through a vocational means for which he feels persistent aversions. No power or influence under the sun can change the affective aversions without changing the significance of the object. So soon as the vocational means and the object become adjusted to suit the primary acquisitive cravings, the personality develops its efficiency and accomplishments in leaps and bounds that amaze the observer and the individual himself. The herd joyfully exclaims: "He has found himself."

Old men and women of the Kentucky mountains trudged the moonlighted trails to the township schools to learn to read and write in order to acquire the affective gratification to be obtained from reading the letters of their absent children. The rate of learning of men and women of seventy astonished the educational world. There is no such thing as being too old or too stupid to learn when the object fits the vital acquisitive needs of the personality. In such light one is never able to forgive the hideous impositions of useless, pseudo-knowledge forced upon the student by many sterilized, academic courses of education.

It is well known that in efficiency tests by controlled word association, unpleasant reaction words consume time because they reflexly arouse a tendency to suppress them which conflicts with the tendency to speak them. Dr. M. E. Haggerty and I found (39), in a class of male and female students of psychology, that, although the females were more efficient in the Woodworth and Wells cancellation tests, naming tests, substitution test, and two-direction tests, they were less efficient in the series of controlled word association

tests, apparently because it was necessary to be "on guard" against embarrassing associations due to the greater severity of social censorship for the overt behavior of female than for the male.

Curiosity and ambition are manifestations of freely working affective cravings. There are two types of curiosity and ambition which distinguish men and women more definitely than the pigment in the skin or the contour of bones. Individuals who strive chiefly to hide an ineffaceable sense of inferiority and attain social advantages for self-aggrandizement; and individuals who strive and work for the sheer joy of self and racial improvement.

In the latter the standard of fitness and worth rests solely upon the indelible sense of work well done. The great secret of education lies in the conditioning and freedom of affective functioning. Since the affective or autonomic reactions are so conditioned that the pursuit of happiness develops means and ends that are either harmful or beneficial to the self and civilization, the future educator and psychologist must see to the nature of the individual's conditioned affective reactions—and his insight.

Love is the most consistently potent of the affective cravings. The personality always grows in the direction of love's acquisitive needs, though its social course may be zigzagged by fears, hatred, shame, pride and grief. The ultimate reason for all purposive behavior contains a vital determinant which, if the individual is honestly frank, is easily traceable to love. When love is so conditioned that only those love-objects which are characteristic of maturity will give satisfaction, the personality becomes creative and self-sacrificing.

Matured love, in order to acquire its object, must create and cherish. Because of this the child should be permitted to acquire true insight; should be educated to understand itself, to live for its maturity and should be so trained that fear and anger will be aroused by that which threatens to deprive love of its goal. And love should not be directed by repression of shame. It should be so finely poised and conditioned as to be independent of social fears. Since the needs of the individual are so complicated that society is necessary to gratify them, the creativeness of love must include society's welfare as well as that of the immediate love-object. Our neighbors must have fine families in order that our children shall develop finely and mate well.

The influence of associates is genetic because of the tendency of the affective reactions in a group of individuals to imitate one another. The eternal necessity for the harmonious behavior of the herd in its

struggle for existence is obviously the phylogenetic source of this tendency in man. Men and women tend to flock into cliques, societies, fraternities, churches, according to the acquisitive or avertive needs to love. Behind the ambitious strivings of the youth is always the compelling desire to fit himself for the winning of the love-object. The mental image of this goal becomes the spur of ambition, and his toughened courage makes the final achievement a possibility. All other laurels and accomplishments, no matter how finely they reflect upon the progress of civilization, are but incidental means for the winning of the love-object, and the love-object, in itself, is but the most satisfactory means for the autonomic apparatus to fulfill its biological career. The scientist in his hermitage nurses his ants, germs and electrons, as he searches to rediscover the cradle's secret of happiness. *All men and women are interested in but one ultimate secret, the genesis and maintenance of potency, of life.*

The asylums and the streets are filled with adults who have been unable to transcend the love cravings of infancy. The slums and tenderloin swarm with the victims of unhappy childhood; wandering heroes who crave, insatiably, to eat the dirt of the world.

For them, competition and restraint, in order to attain a state of social creativeness, is impossible. They must be flattered and petted like children to prevent anxiety and confusion. Their voices, words and manners betray the infantile posture of the affect which has become fixed, if one will but see through the compensatory demonstration of toughness and braggadocio. In many, disastrous grievances came when the social pressure to break away from parental dependence was resisted by a fixed attachment. In order to avoid anxiety, confusion, and dissociation of the personality they have had to live so all things might possibly some time be theirs in order that one thing might be found. Like an Emperor of Dreamland, the dementia præcox marries his mother and rules his world, in his fancies. For unbridled debauches in a world of imagery, he abandons forever the realities of life. Through disuse, his hands and his muscles become as soft as an infant's; most unlike the postural tonus of virility.

The physical attributes of the individual, though pertinent, are always secondary to character formation. We find, right and left, in every social state, every variety of character in every variety of body of both sexes. When compensatory strivings for physical inferiorities do occur, we find that the inferiority resisted the fulfillment of the individual's affective cravings. Similar autonomic tensions show similar behavioristic symptoms, even though indi-

viduals vary in race, caste and physique. The primary emotions (hunger, fear, hate, love) of birds, animals and man cause very similar postures and overt movements.

Psychoanalytic studies of character formation have revealed, as the experiences and feelings are recalled, that, in every case analyzed, the reactions of today were partly determined by the reactions of yesterday, and so on back, down the years, through adolescence and infancy. This does not establish, finally, the inheritance of the fundamental traits, but throws the foundation of character formation upon the parents or guardians of childhood. Critical physiological conditions and the influence of associates subtly condition the affective adjustments in infancy as the sculptor moulds his clay. Earlier reactions may later determine affective repressions, and, gradually, as the clay hardens, so the affections of maturity become fixed.

The Value of the Image of Reality

Frazer (40, p. 52 ff), after collecting an enormous series of observations of the customs and rituals of savages and primitive peoples, formulated the inference that the event which it is desired to bring about is represented dramatically, and the very representation, it is believed, effects, or, at least, contributes to, the production of the desired event. It is an old axiom in psychology that when a desire is inhibited it causes discomforts and anxiety. The value of producing the event in imagery has obviously a psychotherapeutic effect upon the uncomfortable savage, as well as the civilized man.

Frazer reports that certain savages, who wished to be strong and difficult to hold in combat, attached pieces of ox hide to their paraphernalia and an amulet of frog's skin to their bodies.

Some preadolescent boys, who were training themselves to do acrobatic stunts in their penny circus, rubbed themselves with a paste they made out of cooked angleworms. They declared it made them "limber."

A young girl, who was obsessed with fear that her mother might die while away on a journey, saved a glass of water from which the mother drank before starting. The mother having partaken of the water, seemed to cause it to become a part of her and through preserving it the child comforted herself, despite her obsessive fears, with feelings that by her act she was saving her mother's life.

Frazer concluded from his data that one of the principles of sympathetic magic is that any effect may be produced by imitating it. This is certainly the underlying principle of modern ritualistic

religion. Psychologically it is however only another manifestation of the conditioned needs of the affective sensori-motor system obtaining comfort through substitutions.

Any affect produces unrest, perhaps anxiety and discomfort, until it is neutralized by the acquisition of adequate stimuli. Then a pleasing feeling of potency suffuses the organism. When these stimuli cannot be extracted from the environment images or symbols are substituted which are identified by associations of *similarity* or *contiguity* with the desired reality. In proportion as they approach the reality they give comfort and affective rest. This is the affective process that determines the behavior of savages, girls, boys, all men and women. It is this affective principle that creates art. Rodin's *le Penseur*, and *Pygmalion* and *Galatea*, as well as Shaw's *Pygmalion*, may be recognized as reproduction of themselves. The fashion designs of *Erté* are his crucifical self in monk's clothing. *Mona Lisa's* smile was the recreation of *Leonardo Da Vinci's* mother's smile (41) and *Darwin's* inspiration for the origin of species and theory of evolution are easily traceable to his mother's fascinating riddle propounded to him before he was eight years old, that by looking "*inside*" of the flower one can read its "*name*," secret of its origin.

When some one who is dear to us dies, we derive great comfort from dreams in which he appears as alive and happy. The psychopath often experiences comfort from his hallucinations and delusions. An impotent, auto-erotic, dementia *præcox* male derived great pleasure from rubbing a stick with his fingers, claiming that it furnished power for the Pennsylvania Railroad. (This patient wore out one stick after another.) The hallucination or delusion may cause great anxiety and still be a wish fulfillment that gratifies a repressed affective craving. The analysis of wishes for the death of people, dreams about friends and relatives dying, obsessive fears, and compulsions have demonstrated this. A woman, who could not induce herself to sue for a divorce, which she wanted, was horrified to dream of the death of her child. It bound her to the marriage and later in her psychosis she worried about the child being killed or kidnapped.

The mechanism of the hallucination in the insane is not essentially different from the ordinary mechanism of mistaking a stranger for some friend or enemy. The savage's adoption of imagery is the same in principle as our passion for photographs, reminders, souvenirs, charms, rituals.

The functional psychoses were utterly unintelligible until observers

learned that the behavioristic expressions and symbolic content of consciousness of the psychotic could be so correlated as to show that they gratified certain intense, unmodifiable biological cravings. It has been found that the psychopathic personality has become more or less dissociated because of his conflicting motives or affective needs. In each instance the more dominant biological motives, because of this conditioning, required for their gratification stimuli of a definite nature and frequently from socially tabooed objects, so that the social motives of the personality could not tolerate their acquisition. The irrepressible biological cravings then apparently obtained gratification through the utilization of sensory images (hallucinations, symbols and delusions) instead of actual sensations produced by exogenous stimuli. The endogenous sensory disturbances were given the vividness and persistence of reality by the cravings.

The opponents of the pleasure-pain conception may hold that, although throughout biology the great dynamic principle is to avoid the painful stimulus and acquire the pleasure-giving stimulus, in man at least a contradiction is to be observed when he sacrifices his best interests to duty. Careful consideration does not support the inference that even then any other than the pleasure-pain principle exists. The mother suffers injury to save her young because her own danger is a lesser pain than the perils of her helpless young. The death of the hero in the trenches is an accident of his business and not a wish fulfillment. He goes there to fight, and dies by accident. In instances where self-sacrificial death occurs, the affective state is such that the self-sacrifice may be a pleasure. Suicide is often a measure of relief from affective distress or pain.

Individuals may strive in pain and poverty, like saints and heroes, for an ostensibly impersonal object. Although they do not ask for honor or glory, their associates are quick to encourage them with reminders that it is coming. Should some one apparently less deserving get first honor, then the pleasure-seeking motive for the sacrifice is exposed in the protest and discontent, as in the mortal feuds of saints, philosophers, scientists, statesmen, kings, ministers, politicians, athletes, and tramps, for honors.

Tait (42, p. 31) found in a series of studies on (1) the capacity to remember pleasant and unpleasant words, (2) the capacity to recall a list of indifferent words after having something pleasant read to the subject, and another list, after having something unpleasant read, and (3) remembering pleasant and unpleasant colors, that (1) "Pleasant impressions are remembered better than unpleasant,

and both are remembered better than indifferent ones"; (II) "Not only are such impressions themselves remembered, but they seem to exert the same influence on other material. Unpleasant impressions have the opposite effect, that is, they exert a repressing influence on other impressions."

This characteristic of learning is only another demonstration that every affective state has a dual nature toward the environment: that is, the tendency to acquire neutralizing stimuli and to avoid the stimuli that do not have a neutralizing capacity for the peculiar needs of the affective state. The autonomic apparatus maintains its equilibrium through the simultaneous seeking of its many cravings for gratification.

The Acquisitive and Avertive Affective Needs and the Recall of Impressions of Experiences (Memory)

In the study of the psychoneuroses (15) it has been found that the affective state seems to determine the degree of sensitiveness of the receptor for the stimulus, as the affect tends to avoid or use its stimulus. This is probably the process of attention and gives us a possible clue to the physiological nature of memory. At any moment, we are aware of only an extremely small portion of our experiences or memory capacity. The awareness shades from central interests like the glow of a light in the night, to the waning subconscious periphery and on into the total darkness of unconsciousness. As the affective stream winds its way here and there through the environment, the content of consciousness is changed in vividness and kind of sensory images to suit the acquisitive and avertive needs of the affective stream. Its resistance is lowered or raised to the functions of different divisions of the organism, as it uses the final common motor paths, and this determines the kinesthetic stream's nature. This suggests, therefore, that, if an essential element of thought is the kinesthetic image of movement from motor-sensory postural functions, *forgetting is a form of physiological or functional anesthesia due to autonomic-affective resistance for the receptor group or motor-sensory functions which would produce the unsatisfactory kinesthetic sensations and the unsatisfactory thought. The recall of a memory or sensory image is the affective process lowering its threshold of reaction to the functions that have been previously avoided. Absolute forgetting is, perhaps, then, a form of atrophy of disuse.*

The Affective Functions and the Content of Consciousness

Since we are never conscious without being conscious of something, it is necessary to consider consciousness and its content as one phenomenon.

Consciousness of self, as an awareness of the self, occurs in the same manner as consciousness of a complex of exogenous stimuli, *i. e.*, a situation. That is, awareness of the self exists in the form of a stream of vague endogenous activities in which some especially vivid feelings or sensations are in the ascendancy for the moment, and are accepted as being *representative of the whole*. *The activities producing consciousness of self are endogenous to the body, and awareness occurs ONLY when the physical activities are such as to produce (sensory) reactions in the receptors which are adequate to arouse affective responses.* When no receptors exist to react to a particular type of stimulation or irritation, no awareness occurs. It seems that no matter what the fantastic nature of thought, we can become aware of nothing but the activities of our receptors. On the other hand, even though the receptor is adequately stimulated and the central and autonomic neurone systems react strongly, as shown by the experiments of Netschaier and Wertheimer (4, p. 19), no awareness occurs if an anesthetic prevents the higher association tracts from integrating the *body into a unity*. Crile (16, p. 6) demonstrated that nerve cells in the cerebellum showed molecular changes of the disintegrating type upon prolonged painful stimulation during deep anesthesia. He has also shown that, if the afferent neurone is "blocked" with novocaine, no awareness of vigorous stimulation of the shut-off receptors occurs. One may have an inflammatory process somewhere on the surface of the body or within it for several hours or days without becoming aware of it, although quite marked physical disturbances are occurring. As awareness occurs in such cases, the organism is adjusting itself as a *unity* to the special activities of the inflamed part. Similarly one is only intermittently aware of a repeated stimulus such as the ticking clock, or a constant stimulus such as the pressure of the hand on the paper as one writes. Manifold other afferent currents which are subliminally active at the same time do not cause distinct awareness until some one part, like the cramped foot, as the stretched or compressed parts become hyperactive, finally causes the organism as a whole to make an adjustment. Awareness of the cramped foot need not occur when a simple reflex adjustment is sufficient to relieve it. One may be seated in a position so that the foot may be extended for relief without other segments of the body

making adjustment. Then no awareness occurs. If, however, it finally becomes necessary for the whole body to adjust, then awareness occurs concomitantly as the adjustment proceeds, and to the degree that an adjustment becomes necessary by the body as a unity.

When one is conscious of a complex object, as a desk, only some of its attributes are producing awareness, like its color, form and style, perhaps its material, while its contents or mechanisms are unnoticed. The attributes which cause awareness, however, are usually accepted to represent the whole. This holds true for a cigar, a flower, a country, the stars. Woodworth (43, p. 15) holds that for himself "all recall is of facts previously noted freed from the concrete setting in which they occurred when noted."

Similarly, when we are conscious of ourselves we are actually only conscious of a very small part of our activities or attributes at the moment and they represent the self as a unity. We may be conscious of ourselves through a headache, an error, dress, failure of movements, successful movements, compensatory respirations, stiffness of the eyes, the visceral tensions of the moment, etc. When we are conscious of reproducing a past experience, only certain details of the experience are recalled, which we usually consider, without hesitancy, to be representative of the whole.

In consciousness of self or of the environment, usually, those attributes of the self or of the environment that happen to be causing the strongest reactions of the moment represent the self or the object as a whole. *Consciousness or awareness at any moment is the reaction of the organism as a unity to the sensational activity of any one or several of its receptor fields.* The content of consciousness is the special activity of any or several of the receptors of the organism, and this particular state of activity of the receptor may be considered as *sensational*.

The reaction threshold of the body as a whole for a receptor may be attained by increasing to a special degree the activity of the receptor, overcoming the affective resistance, or by decreasing the affective resistance, until it reacts to a subliminal stimulus, as in strong hunger and poor food. In psychoneuroses, wherever diminished sensitivity of a receptor-field is complained of, upon an adequate psychoanalysis, we find an affective aversion or resistance for the receptor's functions. On the other hand, where hypersensitiveness of a receptor-field is causing discomfort, we find an increase of affective acquisitiveness for the particular receptor group—as the aches of the "railroad spine" until an indemnity has been received, or the painful vision in the incestuous peeper. When we force our-

selves to study a definite subject, affective resistances are brought into play in order to raise the reaction threshold for all our receptor-fields except the visual or auditory, so as to enable the affective cravings to acquire only certain stimuli. The affective craving may even specialize on certain forms of stimuli of a receptor field and block out all others, as the sleeping mother's response to a baby's cry. (Her fear becomes conditioned to react to certain auditory stimuli.)

The resistance to disconcerting stimuli, when we are trying to study, is usually a mild form of aversion in the sense that we tend to remove them. By maintaining a resistant posture, which is always recognizable because of its characteristic fixedness, we destroy the usual potency of commonplace stimuli, as when we refuse to recognize another's remark while we are trying to study. When the affective craving is intense, as in love, or anger, or fear, the organism as a whole cannot comfortably endure awareness of anything that does not pertain to the neutralization of the affective disturbance, as conservative advice. Innumerable illustrations may be gathered to illustrate the fact that the content of consciousness is determined by the autonomic-affective cravings, except, perhaps, when destructive stimuli press themselves upon the organism and reflex retractions are made. Even then it is probable that the organism as a whole does not begin an adjustment until the autonomic apparatus has proceeded with characteristic affective reactions of fear.

All forms of thought or knowledge, no matter how abbreviated or abstract, seem to be analyzable into reactions of our exteroceptors or enteroceptors, as they are activated by exogenous stimuli, and become qualified by our proprioceptors through muscle functions. We understand the behavior of an animal or individual by reflexly imitating it with postural tensions. Overt movements are often used spontaneously, particularly by children, to make the sensory reproductions more distinct. The Greek column, because of the astute insight of the ancient Greeks, was so constructed that it gave a comfortable sense of balance and power to the observer. When we see objects that are out of proportion we reflexly (imitatively) have feelings which are out of balance and compensate with a tendency to correct the object, so as to give ourselves comfortable feeling. The phenomenon of course only becomes apparent to one who learns to recognize it. We tire of people who cultivate eccentric poses, because we must resist the reflex tendency to imitate and correct them. Even our vocal cords and muscle tensions react to their drawing

or falsely cast voice sounds. The embarrassed speaker embarrasses his audience and one may hear remarks about helping him through. We are thrilled by a fine Hamlet. One may often observe the unconscious imitativeness of the affective functions in a group of individuals. In the imitative facial expressions and bodily movements of children this is very noticeable. When we happen to strike a posture that is characteristic of some one whom we have known quite well we find ourselves thinking of him.

The child learns that a straight line is the shortest distance between two points by passing a part of the body or the entire body between two points. This journey must usually be made several times before the axiomatic conviction is attained. We are convinced that two parallel lines will never meet because, as we project ourselves into space along two parallel lines, we remain parallel in our projections. Multiplication and division become abbreviated forms of addition and subtraction through movement. All mathematical calculation, no matter how abstract, seems to be dependent upon a specialization of muscle sense—sense of movement in various directions from a common center and of multiple movements toward a common center—as in attaining the sense of proportions of an object or line by converging the fingers upon it or moving a glance of the eyes over it. The relative size or value of two objects is compared by measuring them by the amount of muscle energy necessary to lift, circumvent, move or make the objects, or how much force they are capable of enduring or exerting.

The content of consciousness, in the form of complicated ideas, is dependent largely upon the simultaneous centripetence of proprioceptive currents from manifold sources of muscular activity. This may be observed in the utilization of overt movements by children as they describe an experience or in the behavior of adults when they have to reproduce a situation in order to explain it because of loss of words. When individuals have fixed ideas a fixed postural attitude is noticeable. Most of the literature one may read is devoted to gratifying our craving to imitate movement, from baseball, mathematics, imageless thought, war, electrons, expulsions from society, murders, and what not. The construction of the sentence is based on the nature (adverbs and adjectives) of movement (verb) of something (subject and object). We become aware of the meaning of the behavior of another person or animal in proportion as we are able to imitate it. When we can't imitate an individual's behavior we are at a loss to understand it. When the stage hero punishes the villain we have pleasant visceral and muscle sensations if we previously felt motives to do likewise. If not we question the

'justness' or the art of the dramatist. If the killing is done with neatness and dispatch, say after a fight under tremendous handicaps, we enthuse with potency. I asked a lady, who had heard lectures on Othello, read the tragedy several times and had seen it dramatized a few years ago, whether or not Othello killed Iago. She answered: "I don't remember. I guess he did." I asked, "Why?" She contemplated further, recalled the behavior of Iago and Othello for a few moments and continued her answer "Because it wouldn't seem (feel) right if he didn't." The genius of Shakespeare, however, only allows Othello to wound the contemptible Iago and then devotes the next, last, 81 lines to a most tantalizing conviction of him as a criminal. Not until the fourth last line does he give assurances of Iago's punishment and above all his *torture*. Apparently the lady, like most other witnesses of the play, was very uncomfortable when the mighty Othello only inflicted a puny, bleeding wound upon the "demi-devil" that "ensnared his soul and body." (Very similar answers were given by several people upon being asked whether or not Othello killed Iago.)

When the lady *recalled* the plot she did so with "ideas" about it, but probably she swiftly reproduced the behavior of Othello and Iago in affective images and muscle tone images (kinesthetic) of the movements of the act. I did and then readjusted myself by reading the scene. She said it did not "*seem* right," meaning "feel right" to have Iago escape.

One evening at the movies the audience watched with expectant excitement a disagreeable, prospective father-in-law as he climbed among the branches of a tall tree, apparently greatly frightened by two leopards owned by the undesirable, prospective son-in-law. One of the leopards climbed rapidly after him while the other sat expectantly at the foot of the tree. As I enjoyed the scene I was thoroughly conscious of strong visceral sensations and muscle tensions. Evidences of similar visceral conditions among others in the audience were evident from the giggles and exclamations. The panic-stricken man clutched at a limb above him. Unexpectedly it snapped. Down went his body; for only a few feet, however, because his leg, unnoticed by us, had been wrapped around a lower limb like a trapeze performer's. Instantly our gasps from fear of the consequences of the fall were changed to convulsive roars of laughter at the trick played with our feelings (viscera).

Only those sculptors, artists, dancers, philosophers, psychiatrists, musicians, actors, poets, writers, speakers who can become conscious of relatively pure, in the sense of unalloyed, emotions can ever

express them clearly in images or interpret them when they occur in others. The artist whose affective repressions and resistances are such that he must keep his true self obscured in his work can only produce empty phrases or expressionless figures.

Today my stenographer complained of making numerous mistakes in her copy. She said she was dropping the letter "s." She was astonished when I asked if she had made up her mind to drop someone whose name began with "S." She admitted that she had. The affective aversion for S had not yet become specialized for the particular S-mith. This gradually occurred after numerous reclamations of the dropped letter "s" permitted a desire to be formed to retain all letters "s" except S-mith.

We know Why, How, or What a thing *is* by Why, How, or What it *is not*. Our knowledge of the environment depends upon our capacity to compare and contrast stimuli. When one receptor field is not contributing enough information as to an object's properties, all organisms having multiple receptor fields apply them respectively to the object in order to learn its due affective value.

Primitive man learned that by comparing and contrasting objects additional properties of things could be learned. Then modern man learned that still further knowledge of the environment could be acquired by bringing various elements in the environment to play upon each other and finally, by standardizing a series of materials by which all others are to be compared, as by the formulation of a series of weights and measures, scientific or exact comparisons and contrasts were systematized and greatly extended.

All questions of Why, How, or What about things or processes always seem to receive their ultimate answer by explaining *How* things occur. I know not *ultimately* What I am or Why, but sometimes I think I know How I do things. The Why of one's behavior, implying a purpose, is readily transposed into How he did the thing if we will recognize that the dynamic factor in the purpose, the Why, was a *compelling wish*. Then purpose, because the force of the desire precedes the formal thought, becomes a mechanical question of How the particular process worked in the individual's physiological functions.

The correlation of the stream of affectivity, as the determinant of the thought content of consciousness, with the stream of affectivity which determines the postural tonus of the skeletal muscles, becomes clear in the concept that certain forms of muscle activity largely constitute the thought process and that we think according to the dictates of our wishes. When we become drowsy and as we fall

asleep our postural coördinations become so dissociated that we must recline. As the postural coördinations dissociate we experience a dissociation of thought and unrelated sensory images.

The destiny and comforts of the individual are so extensively interwoven and so intimately reciprocating in nature, with the interests of society, that almost every craving and adjustment made by the individual exacts some degree of response from the social group. Invariably the autoerotic, for example, after he masturbates, entertains strong feelings of having betrayed the welfare of society, and, as a result, is inclined to become apprehensive and suspect persecution and punishment. Such mechanisms also occur with anger. When, for example, an angry or vicious personal criticism is indiscreetly made about some one, it causes the assailant to feel vague apprehensions of a retaliation. One may observe individuals, after such remarks, meet the unsuspecting objects of their assault with ill-concealed discomfort.

On the other hand a stable sense of dignity, well-being and friendliness seems to result from work well done, especially when it contributes to the welfare of society. This is particularly true for mechanical forms of work—a sublimation of the hands. One observes that wherever individuals support the same measures or cause for the same affective purposes they tend to meet on a basis of intimate friendliness.

The economizing tendency of such affective interests may be seen as the underlying motive of such adjustments, in the effort to avoid a waste of power and assure the efficiency of power as it exists.

Some may wonder how this correlates with the behavior of a howling mob or a destructive invasion. In the behavior of such groups, dominated by hilarious joy or blind rage, one may recognize an economizing tendency to gratify the particular affect, in the monomaniacal concentration of power and interest.

It is necessary to recognize the composite nature of the stream of affectivity and its manifold needs. A destroyed object may please anger but also it may later cause sorrow and regret. Because of the continuous opposition between the affective cravings the tendency to economize power and refine means (movement and devices) must appear in the general trend of adjustment toward improvement, because substitutes and images are less satisfactory than reality. The substitute, displeasing some of the affective cravings, tends to be progressively perfected until it pleases all of the affect. The tendency to refine the affective reactions and poise them more delicately in their adjustments is also characterized by conservation and

control of the motor resources of power and expression. Hence the utilitarian restfulness of music and the arts.

The mechanism of self-control always depends upon the control of the content of consciousness by the socialized cravings (the wishes to attain social esteem which constitute the *ego*), substituting a content of relatively indifferent value until the affective crisis or painful subject has been passed. This is the protective mechanism used by polite society in conversation as well as by the psychoneurotic. By controlling the content of consciousness the organism tends to keep itself unconscious of a vast multitude of minor disagreeable endogenous as well as exogenous stimuli. Soldiers are inclined, through wit and nicknames, to apply a balm of humor to the dangers and privations of warfare.

PART IV

RESTATEMENT AND SOME GENERAL CONSIDERATIONS

A review of the structural plan of multicellular animals and the influences upon consciousness of the autonomic apparatus shows that the autonomic apparatus, the apparatus that assimilates, conserves and regulates the expenditure of energy, determines the nature of the anatomical construction of the projicient apparatus through the atrophy of disused and stabilization of the useful structures. The constructive and destructive processes are so balanced as to generally prevent excessive hypertrophy or atrophy of the necessary parts. Excessive hypertrophy, for example, gradually tends to disuse and atrophic reactions follow until a suitable balance of function is reestablished; that is, if the organism is permitted to choose freely the lines of activity in a favorable environment.

An intimate study of the autonomic functions decidedly indicates that the affective cravings or emotions have a peripheral origin in certain motorsensory functions of the autonomic apparatus. The nature of the affective craving is probably determined by the nature of the postural tensions of the autonomic structures that happen to be involved, and the autonomic functions, through the cravings aroused, determine the avertive and acquisitive interests or behavior of the organism.

It has been shown that various autonomic functions may be *conditioned* in the laboratory to react to indifferent stimuli after they have been duly associated with primary stimuli of these particular autonomic functions. Studies of psychoneuroses and psychoses, as well as individual traits and spontaneous affective adjustments in normal people, show that the affective functions tend to become conditioned to react to, or to require, previously indifferent stimuli that have become coincidentally associated with the primary stimuli of the affective craving. This capacity, of various affective cravings to become *conditioned* to react to, and require, almost specific stimuli, knits the personality into a functional unity, because of the tendency of stimuli to become mixed in the heterogeneous environment. This determines the individual, acquired traits of personality, normal and abnormal.

When an affective craving or particular autonomic disposition

is prevented from attaining adequate neutralization, a heightened postural tension in that particular autonomic segment, as in the anxious tensions that follow the loss of a love object, seems to persist. It then exerts a constant pressure to be relieved. These persistent hypertensions and hypotensions of various autonomic segments, and not the structural conformations in themselves, constitute the character of the individual. A serious physical deformity in a girl is not depressing unless it is an obstacle to affective yearnings that have their sources in other segments of the body.

As an affect-producing mechanism, the hypertense autonomic division may be said to be *repressed* when it is not permitted to make the organism conscious or aware of its needs. The hypertense division is *suppressed* when it is permitted to cause awareness of its needs but is not permitted to dominate the projicient motor system and attain a state of neutralization.

This permits the formulation of the personality and its behavior as follows:

Primary Wishes + Subsidiary Wishes (manifest)

Primary Wishes + Subsidiary Wishes (repressed)

× Environment Resistance = Behavior.

When an excessive summation of repressed cravings or autonomic tensions occurs, their force cannot be controlled by the remainder of the organism or prevented from dominating the projicient motor system, and functional confusion results. This is shown by incoördinations, accidents; errors, obsessive thoughts and cravings, "queer" acts, dreams, hallucinations, delusions or dissociated states of the personality that always accompany loss of control of the affective cravings.

The affective craving or autonomic component determines the postural tonus of the skeletal muscles, the stream of kinesthetic imagery, and, largely, the thought content of consciousness. *When an affective need, like hunger, produces thoughts of how to get food, the affect is already using the projicient apparatus to acquire the food. When an affective conflict occurs, a change in the postural tonus of the striped muscles immediately occurs,* as one may observe in disastrous incoördinations, accidents. Such observations, besides laboratory experiments, reveal the intimate nature of the autonomic or affective relationship to postural tonus and the kinesthetic stream.

Since the affective functions determine the nature of the content of consciousness through causing awareness of satisfactory sensory images, or exogenous stimuli, which they tend to use, or an

awareness of unsatisfactory stimuli, which they are trying to change into satisfactory forms, the misinterpretation (delusion or hallucination) as well as the misrepresentation (lie) is due to an affective craving causing an awareness of endogenous stimuli. That is, old sensory images, which adulterate the individual's awareness of the present sensations of exogenous origin, constitute the wish fulfillment in the delusion, hallucination, lie, fancy or truth.

The affective stream should be seen as a continuous but complex stream of afferent impulses arising, peripherally, from the receptors in the autonomic apparatus. The thought content of consciousness is largely determined by the nature of the affective stream as it effects the postural tonus of the striped muscles. Because of the relations of postural muscle tonus and kinesthetic imagery, the projicient apparatus may be regarded, in a sense, as the thinking apparatus of the body, trying to acquire means to please the affect.

Therefore, in the psychoanalytic study of any personality, or of an act or fantasy, such as an hallucination, a work of art, a poem, play, novel, or Darwin's contributions to knowledge of evolution, the formula to be followed is:

Affective Craving $\times$ Environmental Resistance = Behavior.

Given the Behavior and the Resistance, the nature of the Wishes may be quite accurately inferred; or

Given the Wishes and the Resistance, the Behavior may be quite accurately predicted; or

Given the Wishes and the Behavior, the Resistance may be quite accurately deduced.

The next stage in the analytical study is the disclosure of the genesis of the Wish and its *conditioning* for definite objects and special receptors.

Since consciousness of anything or of the self exists only in the form of awareness of the activity of some receptor-groups, *consciousness may be defined as the reaction of the body as a whole to the special or sensational activity of any one or several of its parts*. A cerebral center or area of consciousness is discredited and the central nervous system is seen to have no other function than that of integrating and reënforcing afferent and efferent nerve impulses.

It is natural to assume that the seat of consciousness or of the "mind" occupies a region just behind and above the eyes, because the eyes and their extrinsic muscles are the supreme afferent channel of the entire organism. No interests may be aroused in anything

without the eyes being immediately so focused as to acquire additional information about its nature. When the eyes are useless, as in total darkness and blindness, the auditory apparatus tends to become the chief afferent channel, which, no doubt, supports the common assumption of humanity that the mind occupies an area in the brain. The search for this mysterious area has long been the will-o'-the-wisp of neurology. No expression of thought is complete without the inclusion, frankly or implied, of a verb. The verb denotes some form of motion, and rarely does the personality refer to or produce an image of a form of motion without the extrinsic muscles of the eyes contributing kinesthetic sensations of movement as the eye follows the visual image of the moving object.

If the scientific investigations of the future should verify the conception of the peripheral origin of the emotions and of thought, and decentralize our old notions of the mind, it would not contribute one iota to the existence or non-existence of the soul. On the other hand, the old notion that the mind has its seat in the brain has given no more support to the soul-hope than a conviction that it exists in the stomach. A certain class of benighted individuals might be driven into distraction if they were deprived of the faith that the "mind" is in that part of the brain, just behind and above the eyes. Their sublimations of the "spirits of the flesh" upward require that they should ascend as high as possible to be safe from the fleshy demon that would draw their interests downward *to the realms of perdition about the pelvis*.

The future of humanity forces one to speculate as to man's place in nature, the nature of his biological career, and the best means of realizing it.

As to his place in nature, man is a vast community of cells, working in systems which are integrated into a unity to further the biological interests of the cellular community as a whole. *The autonomic functions of the organism tend to utilize and organize the proficient functions so as to acquire a maximum of gratification from the environment with a minimum expenditure of energy.* Deficiencies, sin and failures in the struggle for happiness are largely due to the persistence of past or primordial traits that are unequal to the refinements of functions required by the exigencies of the present.

No other source for the impulse to attain goodness, honesty, virility, efficiency, and happiness, in a criminal or a saint, need be assumed, than the mechanism that opposed wishes, striving for their individual gratification, always determine the resultant course of behavior. If one wish is permitted unrestrained freedom to gratify

itself, say, to be extravagant, another wish may be abused in its striving, say, to be judicious, and the ungratified affect causes a feeling of discomfort, and, hence, a sense of inferiority.

The reverse principle holds true, of course, when one tends to be miserly with liberal companions. Here, the wish to be agreeably liberal is abused by the wish that prompts miserliness, and a sense of unpleasantness is produced which the individual cannot well endure.

Upon the above principle, man's code of ethics and social relationship seems to be turning. He is demanding equal rights and privileges, in order to refine himself to the maximum level that his inherent capacities will support. People settle into social strata according to the sensations they give one another. The coarse, crude, vulgar, stupid, are usually opposed to the refined, intelligent, well-bred; or the miserly usually cannot comfortably associate with the extravagant, the immoral with the prudish, the tough-minded with the tender-minded, etc.

The primitive autonomic system protected itself from the fates and stresses of the environment by gradually creating and surrounding itself with a projicient apparatus whereby it could avoid the harmful and seek out the beneficial environmental fields. This method of obtaining autonomic gratification continued through the ages until an ape found that its paw or hand was dexterous enough to use a stick as a means to an end, perhaps for scraping playthings or foods out of holes and crevices. The dawn of civilization came as the ape learned to project himself through exogenous means, *applying himself indirectly*, in order to build a pleasing environment within the greater environment. Civilized man is absorbed in further extending and controlling his readjusted environmental spheres. As he succeeds in accurately projecting himself through his instruments into the future, his capacity for controlling the environment increases. As the ape learned to use exogenous means to attain an end, the tendency to adjust himself to suit the nature of the means probably greatly increased his capacity to modify himself through conscious effort. This, perhaps, contributed to the evolution of the capacity to become conscious of the resources within himself, to exert self-control, and refine his wishes.

As the primitive man's capacity to project himself into the future increased, that is, to imagine (imitate in postures) what his position might be like in the near future, the conflicts between the needs of the social group and the individual required the deferment and suppression of many of the individual's wishes and the formulations of fixed laws. Then man developed the capacity to repress asocial

wishes and obtained his gratification through the use of images, symbols and rituals, the pictorial and symbolic narration of fancies (the age of fables) and historical accounts that pleased his wishes. Hence, the mania for word-sounds and word-signs which created languages, dictionaries, novel-writing, etc.

The lower animals use the method of applying various receptors to an object in order to familiarize themselves with the various qualities of the object. The monkey learned to analyze objects further by tearing them to bits with his hands. Then the ape-man learned that further qualities could be detected by making various objects work upon each other, and, when Man learned to standardize a set of objects by which all others might be compared, so-called scientific investigations began. The quarrel between science and religion has always been a quarrel between gratifying wishes with endogenous fancies or exogenous realities.

Philosophical and metaphysical speculation on the ultimate nature of creation, when based upon the researches and facts of science, has changed its words for ultimate particles of matter from molecules, to atoms, to electrons. The latter term, however, can also only refer to fractions of matter. Fractions of matter are no more ultimate in the sense of being theoretically indivisible than fractions of bricks. The mind is unable to clearly define or conceive of an object without automatically imagining it to have a composition and a capacity for further division.

An attempt to assume that an electron is an indivisible, final and ultimate form of energy or matter does not prevent speculation as to its constitution.

Perhaps the most persistent sources of the belief in a beginning and end of this universe are ungratified wishes that need comforting fancies. The beginning and end of composite objects, as temporary manifestations of the creative powers of the universe, greatly encourage this dream, hence the world is assumed to have had a beginning and the primordial creative force must be regarded as eternal. Only inter-relations of the primordial force have a beginning and an end, but *pure* activity, *as such*, if it exists, can have had no beginning and will have no end, because that would mean a stage of no activity, which contradicts *pure activity*.

The feeling of *unlimitedness to spatial extension* has, for one of its sources, consciousness of the contingency of numerous simultaneously active receptors, as in the relationship of various receptor-groups when they tend to be brought together or separated; for example, the eyes, or the hands. Such experiences may be end-

lessly magnified in number and extent of convergence or divergence. The proportions of a hill are measured by comparing it to other objects, but its size to the individual varies inversely as his climbing power.

The consciousness of *unlimitedness of duration of activity*, or of time, has for one of its roots the continuity of the complex afferent stream, flowing from the exteroceptors, proprioceptors and enteroreceptors, as it modifies the content of consciousness. The muscle-sense of movement may be magnified into an unlimited duration by projecting ourselves, in visual-motor imagery, through space over and over again.

The tendency to believe that unlimited space and time existed before the beginning of the personality is not due to memories of when the personality began, but to our faith in the experiences of those we love, who are older than ourselves and who are able to trace the sequence of cause and effect beyond our earliest memories. The acceptance of this evidence becomes the basis for accepting the evidence of prehistorical facts. One sees this common quality disturbed in psychotics who believe (imagine) that those they love are destroyed and "the end of time has come," seeming to mean the past and the future.

The tendency to believe that the personality will have unlimited duration is a wish-fulfilling necessity. Our repressed wishes force the belief in this possibility upon consciousness. Since we can have no awareness of a state of total unawareness or unconsciousness, we are unable to become conscious of a contradictory state of non-existence. That other personalities, except those we love, shall have a beginning or end, is acceptable on the same basis that an experience has a beginning and an end, but this is not applicable to ourselves except on a basis of common sense.

With peculiar faith we tend to construct parallelistic or monistic philosophies to please our ungratified affections. We are unable to imagine anything but unlimitedness of duration and extent of the primordial creative force. The qualities of duration and extent are shown in some form. While we may firmly believe in the limited existence of the universe as we sense it to be, we cannot avoid feeling that an unlimited primordial source with many attributes of our personalities preceded it. Hence we create God in our own image.

The mind seems unable to conceive clearly of a process without some *thing* to proceed. Hence, energy is assumed to be composed of electrons. This seems to be due to the nature of the mechanism of consciousness, for whenever we have a sense of movement or

force we have a consistent sense of an objective cause. We may vaguely imagine the beginning of matter, or electrons, as the result of crystallization of energy, but, so soon as the imagination tries to convert the vague notion of formless energy into a clear conception, it automatically, but persistently, becomes crystallized into particles of some *thing*.

The great tragedy of the human mind is its inability to thoroughly convince itself that it need never and can never know the ultimate nature of the universe; but that its sole problem is the creation of a social state whereby the greatest efficiency, goodness and happiness can be had by all of the number.

The chronic persistence of the world-old riddle of the universe and man's innumerable, unsatisfactory, conflicting speculations as to its nature, indicate the hopelessness of speculations based upon any other than sensory reactions. The creation, in fancy, of a heaven, in which our priceless longings will be fulfilled, certainly has a valuable psychotherapeutic effect so long as its influence does not become debilitating. Hope and faith are often all that keep the vital organs alive, but they also, more often, keep them lazy.

Common sense is at last influencing men to abandon the pursuit of solutions for useless riddles and is encouraging pragmatic interests in living. Gradually, man is learning to dignify labor and efficiency, honesty, goodness and happiness as sacred to the cause of the human race, and slowly, but surely, mysterious symbols and rituals are waning as an energizing necessity.

As we succeed in mitigating the persecutions of nature and of one another we tend, less and less, to resort to energizing symbols in order to give ourselves grace and comfort. Gradually, our affective needs are becoming conditioned to enjoy the realities and exogenous needs of life more than the fancies.

Enough is known of the nature and vital needs of living things for the thinker to recognize that all forms of the biocosmos are so intimately related to one another and so interdependent upon each other for existence that practically no form of life can exist independently of all the others. Although animals seem independent and self-sustaining as they move in space unattached, they are, relatively, little more independent in their needs than the wandering phagocyte in the blood stream. We must learn to see the body as a community of cells and all organisms as one grand community. Upon the apex of this seething, throbbing biodynamic pyramid, the universe has succeeded, after ages of struggle, in erecting its semi-sublime, egotistical masterpiece—Man.

If one, in a mood of reflection, will let his imagination pass back down the inclined spiral of organic evolution to the existence of the primordial cell, far beneath and long ago, one may see it, as it lay buried in the slime and ooze, receive its first inspiration from the warm rays of the morning sun. One may see this cell gradually work its way out of the slime into the streams and seas, onto the land and into the air, generally toward the light. In its higher communal forms, one may see in its strivings the fundamental law of the extension of its power and the refinement of itself, following the dual mechanical principle of attaining a maximum of autonomic gratification with a minimum expenditure of its energetic resources as a means of attaining greatest affective development, freedom and happiness. This principle is so universal and fundamental in the evolution of living things that one wonders if it is not a fundamental attribute of the constitution of *pure activity*, and whether or not this incessant, irrepressible urge in the nature of man, to understand and reconstruct his environment, is not dignified by a *sublime necessity*. One's impressions of the nature of cosmic evolution is greatly influenced by his feeling whether or not he is *a means to an end or a means to attaining a more refined means*. *The pleasures from the refining process are the reward.*

Is not man, as a functional entity, like a corpuscle in the living universe, created for and depended upon to assist in furthering the refinement of the sublime cosmic tendency? If so, then labor and sincere endeavor becomes augustly dignified. Equality of opportunity, fulfillment of duty and affective freedom become divine obligations of men to men.

There is, besides a frank expression of democracy and equality, a divine economizing of human energies in "the golden rule," that men shall do unto others as they wish to be done by. Perhaps then man's place in the great cosmic scheme is more than that of being merely an optimistic monkey that must live and die. Perhaps he is a necessary contributor to the vital, fundamental endeavors and evolution of the living universe.

Newton's first law of motion, that a body at rest continues at rest until acted upon by some external force, and its corollary, a body in motion continues in uniform motion in a straight line except in so far as it is acted upon by some external force, seem to have a biological application in the mechanism of the autonomic-affective craving acquiring gratification. In their relationship, when environing forces attain a state of equilibrium with a constellation of energies having centrifugal tendencies (the cell) a certain mean of activity will be maintained so long as either factor does not change suffi-

ciently to disrupt the energetic balance which constitutes the metabolizing cell. When a seed, cell, or egg is placed in its appropriate environment and the temperature, that is, the activity of the environment, is raised to a proper degree, multiplication of the cell begins. It may also be checked by excessive activity (heat) or a decrease of activity (cold) of the medium. If the energetic constitution (molecular) of the medium is altered, the centrifugal-centripetal balance between the environment and cell becomes altered, and the course of the balance (growth of the cell) will continue to be (proportionately?) altered, it seems from the biological experiments of Loeb and others.

The falling body gravitates straight toward the center of the earth, unless acted upon by some other force, and one may see in its flight toward its final equilibrium a perfect economy of motion in that there is no waste of motion in its course. In chemical reactions, as when sodium hydrate is dissolved in hydrochloric acid, and salt-water results, a similar economy of motion is to be recognized in the dissociation, flight and reorganization of the various atomic constituents. This same principle of economizing of motion is obviously at work in the maintenance of autonomic or affective equilibrium by acquiring a maximum of adequate stimuli with a minimum expenditure of movement. This mechanism facilitates quickness and directness of neutralization through the perfected coördination of movement. It is the most likely mechanism to support autonomic equilibrium, despite its very rapid, constant, complex changes due to metabolism and environmental changes.

In the mechanism of wishes or cravings reënföring one another, and accelerating and coördinating movement for the acquisition of a satisfactory object, just as the summation of afferent impulses finally dominates a final common motor path, may be recognized a biological manifestation of Newton's second law of motion—that change of motion is proportional to the force applied and takes place in the direction of the force. The corollary of this law, that motion of an object is inhibited according to the nature of the resistances, applies to the mechanism of the suppressed wish or autonomic tension. Behavior is the resultant of parallelograms of forces-wishes. The third law of motion, that action and reaction are equal and opposite, has probably determined the principles of the mechanical construction of the body, in that the position of a bone, limb or the entire body is maintained and controlled by having forces (muscles) oppose one another and a definite position is attained by making flexion and extension equal; hence preventing the

body from displacing itself from a desirable into an undesirable position.

The opposition of wishes or autonomic cravings, as forces determining the course of behavior (movement), prevents the personality from deviating too eccentrically from the normal, because certain wishes, which exert a balancing influence, being ungratified, cause tension and discomfort. Nature, in perfecting the mechanism by which the autonomic functions should oppose one another, so as to regulate one another, followed the third law of motion, that, to every action there is an equal and opposite reaction. This, perhaps, may be illustrated by the functions of the stomach. Hunger cravings compel the eating of food until the accumulating food, as a stimulus, sets up reactions (equal and opposite) that neutralize the craving, and then follows the opposite tendency of avoiding food; or, if an excess is eaten, a tendency to regurgitate is aroused. The third law of motion holds true for both assimilative and emissive functions.

Love, prompting self-sacrifice, becomes counteracted by restraining fears of getting into a self-jeopardizing position, hence the opposing wishes counteract one another. An individual suffering from a perfect balance of wishes to do "this" and "that" at the same time suffers from inability to accomplish anything.

The tendency of energy, to establish a state of universal equilibrium, has led philosophy, in some quarters, to the pessimistic conclusion that, finally, a universal adjustment, cold and still, would be reached. Therefore, let us lie, eat, drink and be merry, for tomorrow we die.

Two phenomena support the belief that a final, absolute equilibrium is unlikely. The primordial force of the universe has already had infinite endurance, having had no beginning, and having had no beginning we must accept that it is *pure activity*, and, as such, has an inherent nature. This is eternal self-refinement. A final state of absolute equilibrium is unattainable, and the conception of it is not acceptable because of the fact of past infinite duration of activity.

As the philosopher was reduced to the ridiculous *impasse* of accepting that intelligence, whatever it is, exists because "I think, therefore, I am," so the scientist, who is unable to believe that the calcium in his bones is alive, will be forced to the realization that, even though the chemical processes of life have no vitally different principle than that to be found in the physical and chemical reactions of the elements, he is *alive* and *must live* according to the autonomic laws.

No matter how simple science may, in the future, demonstrate the process of life to be, Nature's capacity to create and improve Life's mechanical prowess cannot be denied. The energetic processes of the universe must surely follow some principle that is inherent and fundamental to its nature and some of its laws should be manifested in its workings. Hence, the ethical interest of man should reveal some of its principles. One may infer that *error* and *evil* are due to vestiges of past mechanisms that were at one time necessary steps in evolution, as, for example, the primitive ape-man's sexual affections (5) for animals which led to the capacity of cultivating herds, packs and flocks, and that these traits must become refined, and the refinements require persistent support in order that they shall have the endurance and efficiency that the present stage of civilization requires. Men unconsciously measure one another according to their sincerity, and sincerity of the wish is the individual's only reliable means of refinement of activity. *Moral laws are only moral in so far as they promote the progress of humanity.* No matter how holy and sanctified the laws may seem to sound, if suppressive wasters of energy they are immoral.

The curiosity of man must include some speculation on the nature of the goal of the great cosmic scheme in so far as it pertains to the assurance of the fulfillment of his wishes. Kings and high-priests have taught, for obvious reasons of self-identification that justified their pleasures, that it was to the end of glory and homage.

Herbert Spencer saw in the tendency of things an automatic evolution from a stage of dull gray homogeneity to a stage of ultra-varied and brilliant heterogeneity and then on into dull gray homogeneity, to be repeated forever without end. This depressing interpretation neglects the inspiring nature of the ceaseless, self-refining tendency of living things, and does not consider the career of the biocosmos as a whole. One feels that surely universal activity must have a perfect process of working since it has had unlimited endurance. That is, it never had a beginning. The idea of beginning is indigenous to man's awareness of his sensations. The inference that man has a truly dignified and sacred contribution to make is supported by the economizing of movement and his unavoidable regret of neglect and waste. (With apologies, this must be admitted as distressing to a lazy man's ideal of the perfect state.)

In this dark hour of human events, when the desperate carnage of men threatens the foundation of civilization, the struggle "to make the world safe for democracy" from the plots and schemes of

self-centered men, who would style themselves as "gods," alone is sufficient to redeem the slaughter and the waste. The economizing of human interests rings true as steel in the Declaration of Independence and Lincoln's "Government of the people, by the people and for the people." How it contrasts with the sodden, self-aggrandizing machinations of a bigoted plutocracy!

A world-state of individual equality and opportunity, so that each personality may enjoy affective freedom and develop to the fullest his powers for efficiency, goodness and happiness, alone, must finally endure. A condition of human affairs is coming when the affective strivings of the creator and the reconstructor shall alone merit the dignity and respect of men. Labor will be recognized as the only sincere and sacred tribute of men to God. Art and song and play then will be felt as having a utilitarian value for the wholesome relaxation and evolution of the personality, and parasitism, wastefulness and profligacy will be recognized as disgusting crimes against the welfare of humanity.

The whole principle of Christianity and the mechanism of conversion may be summed up in the Renunciation of Envy.

The facts that are being gathered through the analytical study of the affective struggles of the insane, the sick and deformed, the oppressed and unhappy, make it evident that from out of the dismal night humanity is unvirtuously approaching the dawn of a new social era.

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